

LONDON, Sept. 13, 1732.

PROPOSALS

For Printing by SUBSCRIPTION,

THE

NATURAL, EXPERIMENTAL, and MEDICINAL

HISTORY

OF THE

MINERAL WATERS

OF

Derbyshire, Lincolnshire, and Yorkshire,

Particularly those of

SCARBOROUGH.

WHEREIN,

They are carefully examin'd and compared, their Contents discover'd and divided, their Uses shewn and explained, and an Account given of their Discovery and Alterations.

Together with the

NATURAL HISTORY of the EARTHS, MINERALS and FOSSILS through which the Chief of them pass.

THE

Groundless Theories, and False Opinions of former WRITERS are exposed, and their Reasonings demonstrated to be injudicious and inconclusive.

To which are added,

Large MARGINAL NOTES, containing a Methodical Abstract of all the Treatises hitherto published on these WATERS, with many OBSERVATIONS and EXPERIMENTS, collected from various Manuscripts now in the Libraries of several ingenious Gentlemen.

By *THOMAS SHORT*, M. D. of *Sheffield*.



This W O R K will contain,

- I. T H E History of the Warm Waters.
- II. T H E Purging Steel Waters.
- III. T H E Purging Sulphur Waters.
- IV. T H E Steel Waters which are Diuretick.
- V. T H E Plain Sulphur Waters.

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T H E whole will be render'd as easy and useful as possible ; and is the first Work of this Kind, ever yet attempted in *England*.



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the Sum of
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Sept. 17. 1733

Dr. S H O R T 's

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Mineral Waters, &c.



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THAT Dr. *Thomas Short* be desired
to Print his *Natural History of the
Mineral Waters of Scarborough, &c.*

HANS SLOANE, *Præses R. S.*

34 d 15

THE
NATURAL, EXPERIMENTAL, and MEDICINAL
HISTORY
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MINERAL WATERS
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Derbyshire, Lincolnshire, and Yorkshire,

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To which are added,

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By THOMAS SHORT, M. D. of Sheffield.

Aqua Fontana limpida ad Sanitatem conservandam saluberrima, ad amissam recuperandam Mineralis praestantissima.

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Dartford, Lincolnshire, and York/shire
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They are carefully examined and compared, their Contents discover-
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AS ALSO,
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By THOMAS SHORT, M.D. of Sheffield.
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of great importance.

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And to the
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OF
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*YOUR great Name and distinguish'd Character in the
World, your Abilities so universally acknowledg'd for
being the most competent Judges of all the various Phæno-
mena of Nature, and of the whole Extent of Natural and*
A 2 Expe-

DEDICATION.

Experimental Philosophy, ~~have obliged me to make this my~~
humble Appeal to you, and to crave your Patronage and
Protection of the following Sheets, without which I should
scarce have presumed to expose them to publick View.

As you are ready to favour all laudable Attempts for the
Improvement of useful Knowledge, I shall be highly pleas-
ed, if this Essay towards giving a true History and adequate
Analysis of the Mineral Waters, which constitute the sub-
ject Matter of the following Treatise, obtain your Approba-
tion and Countenance; for while you, Gentlemen, approve
and give a Sanction to it, I shall not in the least regard the
groundless Cavils of supercilious and pretending Criticks.
As I have contradicted the generally received Opinion of the
Non-existence of fixed Vitriol in Mineral Waters, and gi-
ven undeniable Evidence of its being often to be found
there, so I have (since these Sheets were put to the Press,)
procured from other Mineral Waters some Sort of Nitre,
which are undescribed by both Ancients and Moderns, and
have not so much as Names given them; Specimens whereof
shall quickly come under your Examination, that you may
not take my ipse dixit, nor your Authority be abused.

I must beg Leave to observe to you, Gentlemen, that
tho' several of the Experiments may possibly seem in them-
selves trifling, yet when they are compared with the In-
ferences which naturally arise from them, will, I believe,
be found conducive to the greater Perfection of the Work.
In this View, I humbly conceive that few of them, if any,
could

DEDICATION.

could be conveniently omitted. The Repetitions, I hope, will be readily excused; as I considered, that placing the same Facts in various Lights, and suggesting them to the Reader's Mind in different Prospects, was not only a seasonable Condescension to ordinary Capacities and unexercised Understandings, but might contribute to a greater Perspicuity in general. I am sensible that there are many Defects in this Work, but if I have had the Happiness to discover the genuine Principles which impregnate the Waters treated of in this Essay, and have assigned their proper Uses and Effects, it sufficiently answers the Intention of the Author and will abundantly compensate his Labours. Probably, as Time permits, I may further pursue the Examination of those and several other Waters.

I must beg Leave, before I finish this Address, to embrace an Occasion so happily put into my Hands of testifying my most grateful and humble Acknowledgements for the favourable Encouragement I have met with in the Prosecution of this Work from several Persons who are an Ornament to the Republick of Letters, as well as to your Illustrious Body. In this View it is more immediately incumbent upon me to acknowledge the great Honour and Advantage received from the Humanity of the Honourable Gentleman your President, who has not only furnished me with several necessary Materials, but was always ready to remove Difficulties, and to excite me to an Enquiry of this Importance, whereby I have attempted to banish all precarious, ungrounded, and meerly notional Hypotheses

DEDICATION.

Hypotheses relating to this Subject, and to treat it upon much clearer Principles, and with a Certainty and Conclusiveness of Induction unknown to those who have preceded me in this Enquiry, and which, by a diligent and judicious Prosecution, may yet be rendered much more extensive.

I am,

Gentlemen,

with all due Respect,

Your most Devoted

Sheffield, September 5, 1733.

and Humble Servant,

THOMAS SHORT.

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P R E F A C E.

IT may here be proper to give some general Account of the Nature and Usefulness of our Subject, with the Reasons why it has been hitherto cultivated to little Advantage. And first the Dignity and Usefulness of the Subject, cannot be more emphatically express'd than in the Words of the Philosophical Transactions, which run thus, "Whoever discovers ^a such ^{Nº 51.} healing Waters, and publickly prescribes the safe and right Use of them, does really distribute larger and nobler Alms, than if he built and endowed a Savoy; for this prolongs Life and restores Health both to Rich and Poor, to Natives and Strangers, to Neighbours and Travellers." And Dr. Fred. Hoffman, Physician to the King of Prussia, says ^b that Mineral Waters, ^{Pag. 5. Of Experiments and Observations upon Mineral Waters.} both of the hot and cold Kind, are of such Vertue and Efficacy for the preservation of Health and cure of Diseases, as in the highest Degree to exceed Shop Remedies, prepared by the nicest Art; and that he is well assured "this Fact cannot be disputed, but by such as derive their Arguments from their Ignorance and Indolence, and are no ways competent or experienced Judges in the Case." Again he observes, "that these Waters approach the nearest of any thing in Nature, to what has been so much searched after, viz. an Universal Medicine suited to the Cure of all Diseases. And, continues he, "I would fain know whether any Physician of practical Knowledge and Experience (in his Art) can say of any other Medicine, what I certainly know to be true of Waters, viz. that they effectually cure both with Expedition and Safety^c." Lastly, ^c Pag. 102. he adds, "that such Waters are at the same time the most efficacious and most innocent of all the Medicines hitherto discovered, and that they never fail of Success, when the Physician knows how to apply them seasonably and in a right Manner." And this Author's Translator, who prefers a middle Way between such as extol or decry Mineral Waters above measure, says, ^d "That Nature has done for us all that Physicians aim at, by their ^d Notes on Dispensatories and Collections of Receipts, viz. supplied us with a Set of ^{pag. 98.} easy, cheap, serviceable and safe Remedies, ready prepared to our Hands, in such a manner as the present Pharmacy cannot rival." And hence it
B must

must be owned, that our Subject is one of the noblest and most usefull, either in Physick or Natural History. How extensive is the Use of Mineral Waters at present? how surprizing are their good Effects? how great the Cures done by them? and might be much oftner, were we duly apprised of the Manner of their Operation, that is, did we know their Composition and Contents, and so rescue their Use from the Name of Empirical Practice; which deserves no better an Epithet, whilst we continue Strangers to their Impregnation, Contents, Proportions and Qualities, they being the least studied of any Branch of the Materia Medica; and what shame is it for us still to remain ignorant of so valuable a Part of natural History and Physick, especially when all other Parts of Learning are making such daily advances? But to put all Recovery of Health, and Prevention or Cure of Diseases out of the Question, yet a better Acquaintance with this would lead us to the Knowledge of natural Bodies, hid in the dark Recesses of the Earth; for hereby we are led to the Discovery of Limestone, Coal, Iron-stone, Mineral-Salt, &c. And no doubt long Practice, close Attention, and diligent Comparison might let us into the Discovery of other Minerals, whether dissolvable or not dissolvable by Water. If the Discovery of such Waters be so great a Benefit to the Health of the Publick, how much greater must a true Discovery of their real Nature and Properties be? And this alone can enable a Man to prescribe them advantageously; for as Waters of one kind are found to be an effectual Remedy in some Cases, so those of a contrary Nature must be dangerous or hurtful in the same or the like Diseases; for as nitrous and Limestone Waters are found serviceable in a Diabetes or other Cases where the Blood runs off too copiously by some Secretions; so the light, chalybeate, diuretic Waters must be mischievous in the same. And as strong sulphur Waters, loaded with Salt, are the last resort in Cachexies, Cacochymies and Dropsies, where the Lymphatics are not yet broke; so nothing can possibly be found more pernicious in Hectical, Atrophic, and lean consumptive Bodies; but of this more afterwards. Again, as some Waters are more eligible in some Cases than others; so some of the same kind may be more richly impregnated with the same Principles than others. And this leads us to a Double Comparative History of Mineral Waters; viz. First of Waters of different Kinds, secondly of Waters of the same Kind, and this latter has been hitherto totally overlooked. Hence some Patients have been obliged to drink Mineral Waters four Months, when a Spring of the same kind, more plentifully stocked with the same Principles, would have produced as great Effects in one Month. But some may perhaps imagine that the Examination of Mineral Waters is to no purpose, as believing it impossible to discover and exhibit those Materials in them, that work such remarkable Cures. They will say it is the Mineral Spirit that undiscoverable

ble, intractable, subtile, elastic Mineral Spirit, which produces the Effect, and that this Spirit can never be discovered. I reply, That the Waters considered simply and exclusively of other Helps, will neither answer Character or Expectation; but these assisted by Mineral Matters will answer both; but what these Matters are, we shall see in the proper Place: Nor can it be denied, that the Efficacy of those Waters in thinning the Blood, and opening inveterate Obstructions, greatly depend upon the Quantity and Goodness of mere Water. And as to the Contents of the Waters themselves, we should at least know what an alkaline Earth, and a nitrous or marine Salt will do. And as to the Mineral Spirit, it's not only possible, but practicable and easy to discover this volatile Part of Waters. And when I know the Contents of any given Water, and the Minerals from which it springs, and by which it's impregnated, and at the same time can from Experiments learn what alteration it makes in the Solids and Fluids of the human Body, then I am certain of the Effects of this Spirit; and what further have I to perplex me? Nay more, there are methods of examining Mineral Waters, whereby we find them stored with Principles wholly unsuspected, and utterly concealed from all our Senses before; and yet the Effects of the Waters cannot be accounted for without them; and are therefore charged ignorantly, or indolently, upon an intractable Mineral Spirit.

Secondly, though many have wrote largely upon Mineral Waters, yet most of the Methods used in examining them, have been so confused, inconclusive, and wide of the Purpose, insomuch that it would be surprizing if the Examiners should have made any beneficial or instructive Discoveries, which we shall see fully verified hereafter in the noted Controversy about Scarborough Spaw, and in several others. Thus for Example, Dr. Mayow on the Bath, * tells us, "That because any alkaline Salt mixt with this
"Water, causes a Precipitation, and because, if you pour it into boyling
"Milk, it coagulates the Milk, therefore that Water contains an acid Salt;
"and yet that it has an alkaline Salt, complicated with this acid, because
"its Sediment ferments with Acids." But had he first made the Experiment, he would have found Sea Water coagulate boyling Milk; and that Sea Salt ferments with Oyl of Vitriol; but is Sea Water therefore an acid Salt combined with an Alkali? Again, he says, "there is no Nitre in the
"Bath Waters; for if there were, the Salt left upon Exhalation,
"would burn upon a Coal; tho' he imagines that this Salt, exposed for some
"time to the Air, might be converted to Nitre." Strange! that a Man should dream of the Transmutation of the Genus of Salts, by being exposed to the Air! Why did he not try whether by this method Nitre would become common Salt, or Vitriol become Alum or Nitre. Besides, that Nitre should burn on a Coal, is only to be expected from the Nitre of the Ancients; such

*Vid. Guilot
de The m.
Brit. p. 43.
44, &c.

as is described by Pliny; but not our Nitre. And as for Sulphur, says he, this Water has none, seeing a Solution of Salt precipitates it not. To refute this, I ask, Do not the strongest Sulphur Waters in England carry a load of dissolved Salt in them; and yet is the Sulphur precipitated? Nay, whoever attempted or expected, that Salt should precipitate Sulphur? Again, he says, "purely volatile Salts turn the Waters white, and cause a Precipitation from the stone Powder in them." Sure he never saw Ladies and faintish Persons drink Water with Spirits of Hartshorn, Sal Armoniac or Sal Volatile, or he must have seen that no Precipitation happened, except there was Nitre in the Water. "The Bath, he says, turns not Silver yellow but black, therefore it contains not Sulphur; tho' it must be owned, the Bath has a small Pittance of common Sulphur; but this is separated from the Water, and lies either subsided in the Mud, or floating in the Scum." Sulphur being boyled in Lime Water, the last becomes white, not by the Affusion of fixt Salt, but of an Acid." This is a strange Way of reasoning, there being no truth in the whole, as any one that pleases to try will quickly find. However the Doctor will have these Arguments serve to expel Nitre and Sulphur out of the Bath; nor will he allow Vitriol in the cross and hot Bath. What then remains? why truly, Alum and Earth only.

*DeTherm. Dr. Guidot, * another Writer of superior Note and Diligence, sets out Brit. cap. 4. very unluckily, and makes a trip on the Threshold, saying, "That this pag. 49, 50, " Precipitation in Bath Waters, from the Affusion of Alcaline Salts or &c. " Spirits, is only fine Freestone Powder; being insipid, gritty Stones, &c." But every One knows that the last Property, is more applicable to Chalk, Limestone, calcined Stone, &c. being chiefly Limestone, with a little Ironstone, which is attracted by the Loadstone after Calcination. The Doctor will have the marine Salt in the Bath to be Alcaline; and tho' the Vitriol fly off, both by boyling and standing open, yet he will nevertheless have it to contain an acid Salt, because it coagulates Milk; and which he looks upon as an inexplicable Miracle. The Bath Water when boyled away, or distilled to one fourth, that in the Still will make a Curd, whilst that in the Receiver will do nothing at all; therefore there must necessarily be either Vitriol or Sulphur in the remainder of the Water; but it would have been indeed strange had the fixt natural Salt come over the Helm in Distillation; or did not such a quantity of Salt coagulate boyling Milk; or to find the Sulphur in the Still, after three fourths of the Water was drawn off. "The Vitriol is exhaled, says he, but an acid Salt remains; but of what sort I cannot tell, only it coagulates Milk. Again, the Cross Bath being drawn, the saline Matter not having a due quantity of Water to dilute it, "was driven up in substance, reverberated by the Air, incrustated on the Stones

"Stones above the Water, which was much alcalized both by Taste and Ignition, and from its Pungency and Acrimony, he took it rather for Nitre than Tartar." Now one would wonder how it could come into a Man's Head, to look for Tartar in Mineral Waters, and not as soon think of Sugar or Salt of Wormwood, all three being Vegetables, not Mineral Salts; or how was it possible to guess whether the Salt was acid or alkaline, before he had separated it from the Stone Powder, which there is a most alkaline Earth, or should he expect it to incrustate on the wet Walls, had it all been Salt? "After the Nitre was spent, says he, by the Sediment's being poured on Iron after burning, the alcalized Taste was more remarkable, and further confirmed by its Crepitation and Pungency." Contradictions with a Witness! it's an acid Salt, because it coagulates Milk; it's a highly alkaline Salt, because it crackles and flies on a red hot Iron; when both are Characters of common Salt. To what end serves a Thousand such Experiments, when Conclusions are drawn flatly opposite to the Indications? "It's trifling, says he, to tell me, that what is dissolvable in Water, the Pores of it will receive, till it can hold no more: how can there be just so many Porosities in the Bath Water, assigned for Vitriol, and the rest taken up by other Bodies? I am satisfied to the contrary, that is, from Theory not Practice, this is indeed giving defiance to both the Judgment and Senses of all Mankind. Do we not find Salt, Earth, Stone-powder, &c. lodged in the Interstices of Waters? do not we see from Experiments, that the Porosity of Water is to its Parts, as 39 to 1? are not the Particles of Water globular? and can Bodies of that Figure possibly touch in any more Points than one? hence the greatest Porosity; why then may not any Body, whose Parts are small enough to be supported by Water, lye in its Interstices? and when these Stones are filled with Particles of one Figure, are there not still empty Interstices left for Particles of another Figure, and after that for a Third? When a thinking Man reads such Stuff in grave Authors, it's almost natural to believe, that either they wrote on purpose to deceive, or never designed their Writings to be instructive and useful, but took all this Pains that they might not seem idle. Because the Bath Water coagulates Milk, therefore it must have Vitriol in it; but do our best light Chalybeats, as Pyrmont, German Spaw, Tunbridge, &c. coagulate Milk? or rather do they not retard its Coagulation a Day or two beyond its ordinary time? He told us before, that the Vitriol spent its self either by Exhalation or Evaporation; but here it's come again to coagulate Milk. Pungency and Acrimony stand with him for the Characters of Nitre, tho' common to all Salts. Crepitation and Pungency pass for the Marks of an alkaline Salt; tho' the first is peculiar to Marine Salt, and the other Common. Again, the Bath must contain Nitre, because its Salt is bitter; tho' this is proper to
that

that Part of Sea Salt called Bittern, which is sold in the Shops under the Name of Epsom Salt. It must also be Nitre because it's Purgative, but does not Sea Salt purge also? "As for Sulphur, he is sure, it's there, both from the Colour, Smell, and Calcination of its Contents, but being incorporated with the Salt, both pass the Filtre, go into the Lixivium, and the first is not discoverable but by a strong Fire opening the Salt and causing a Solution of its Continuum". Sulphur cannot be separated from the Salt but by a strong Ignition. Strange! Sulphur indeed if thus inseparably attached to the Salt! tho' always hitherto wanted among the volatile Principles, which would not bear Exhalation, much less Ignition, but by some Accident is here so fixt, that its Separation requires a Force of Fire equal to that of the Purification of Metals, a Work very improper for animal Bodies: Tho' I am well satisfied that some Part of the Sulphur in Sulphur Waters is so fixt to the Salt, that they are inseparable before Ignition, but what a poor Pittance is that, and by no means to be taken for the whole: Tho' the Doctor's Writings are voluminous upon one Water, yet from these Specimens, we see with what want of Judgment his Experiments were made, and how inconclusive his Arguments which are drawn from them.

But we have yet a later Author, who ridicules all Attempts toward a Discovery of the Contents of Mineral Waters by any Experiments, yet in Compliance to the present Mode, and out of his superabundant Goodness, vouchsafes to give us a Scantling upon a medicinal Spring of no mean Character. The Sediment remaining after Exhalation, he tried with Oils of Vitriol, Sulphur and Tartar (because this was sooner done than separating the Earth and Salt, and setting the last to crystallize) with the first two, it raised a very strong Fermentation, but not with the last. He takes Care not to tell us whether it was the Salt or Earth, or both that fermented. He tried the Water with Galls, Balauſtian Flowers, Sublimate &c. but draws no Conclusion from any Thing; only quarrels with another Author, who had obtained 40 Grains of Sediment from a Gallon of the Water, and he could procure only 36 Grains; and because the first said, that when the Water had stood 24 Hours with Powder of Galls, it turn'd green; but he found it continue of a muddy White. The same Reason have I to be angry with him, for I could get but 30 Grains of Sediment from a Gallon of Water, and because it did turn green with Galls, and yet I am satisfied we all write as we found it, the Reason whereof we shall see afterwards.

Let us descend to an Author of still greater Note, viz. Dr. Frederick Hoffman. "He says, the Proofs of an alkaline Salt in Mineral Waters are,
 " 1. Their Conflict with Acids. 2. The Solution of their Salt in Water turns
 " Syrup of Violets green. 3. The same Solution with Spirit of Vitriol makes
 " Tartar

*"Tartar vitriolated. 4. This Solution turns a Solution of sublimate Mercury yellow, &c. Here we are to try these Experiments with the Sediment in the Gross, a great Part whereof is Limestone Powder, which cannot possibly fail to ferment with Acids, nor to turn Syrup of Violets green. He says, * "three pints of Pyrmont Water exhaled, left only 40 Grains of"* p. 61.
*"Sediment, which was an alkaline Salt, and fermented violently with Oil and Spirit of Vitriol." I took care to procure a Bottle of this Water genuine, exhaled three Pints of it, and had 72 Grains of Sediment, whereon I poured warm Water, then gave it a double Filtration, and procured 30 Grains of beautiful white Salt, which fermented neither with Oil, nor Spirit of Vitriol, nor Oil of Tartar, nor Spirit of Hartshorn; Spirit of Salt poured upon it, after they had been mixed a Moment or two it smoaked, this Spirit poured upon clean China, or its Bottle uncorked did the same; so that we cannot allow this for a Fermentation, tho' any of the Acids dropped upon its Earth, caused a vehement Ebullition. This is the Effect of examining Sediments by the Lump, only to save a little Labour and Time. It's evident that this Water containing so much Salt, a large Quantity of it drank must open the Belly, only from its Salt, and not the Doctor's Philosophy. Now the fixt Contents must be the same in England as at the Spring, the Water having not been corrupted or spoiled. In another Place † he tells us, † p. 5.. that all the Acidulæ contain a pure alkaline Salt, which raises a Conflict with any Acid; from which it's very plain, he either tried few, or made his Experiments on the whole mixt Sediment. Nor can I find that he has been at the pains to crystallize any one Salt, but taken their Genus's on slight and unsatisfactory Evidences; for I have seen few or none of the refined Salts of those Springs, that would raise a brisk Ebullition with Acids. His whole History is too short, his Experiments too few, his Conclusions meanly grounded, and not fully established. He says the Waters of Egra are chalybeate, yet neither Salt nor Earth ferment with Acids, then it cannot be alkaline, tho' not common Salt. It must be owned that Hoffman affords more Truth and greater Certainty toward a natural History of Mineral Waters, than all his Predecessors together; for tho' a Chymist, he retains the least of their Dialect of any, and tho' a good Philosopher, yet advances the fewest, and is the least attached to Hypotheses and Speculation, of all that have wrote on this Subject; but it's to be wished he had been more consistent with himself: For in one Place, * "he lays the Mistakes of" p. 12.. "preceding Writers on Mineral Waters on their want of Knowledge in "chymical Operations", and † that he must have Recourse to Chymistry; † p. 30. but afterwards, * "he gives the chymical Analysis of Mineral Waters for" p. 110. "one of the four cardinal Errours, which have prevailed to their Discre- "dit." Where he explains the Origin of the Mineral Spirit in Waters,*
he.

- ^a p. 30. *he*^a says, "this extream moveable, subtile and elastick Spirit is a Portion of the
"universal Spirit, the Fountain and Cause of all particular Spirits in other
"Things, whether in the vegetable, animal, or mineral Kingdoms". But
this Spirit has its principal Seat, and exercises its Powers chiefly in Sul-
phur. Which Distinction and Account of the Origin of the Spirits in Mi-
neral Waters, in this diffusive and unlimited Sense, are manifestly ridiculous.
- ^b p. 141. But when he lays aside his chymical Cant, and talks intelligibly, ^b then he
tells us, "that this Spirit is the Vapour that arises from heated or burning
^c p. 66. "Marcasites. Spirit of Vitriol poured into the Water of Egra ^c raises a
"manifest Ebullition, but when he had exhaled the Water of Egra and
"poured Oil of Vitriol (which is a stronger Acid than the Spirit) upon its
^d p. 67. "unseparated Sediment, there ensued no Struggle or Effervescence". ^d This
is surprizing, that the Water should ferment with a weaker Acid, and not
the Sediment with a stronger. But he is still more out in what follows,
viz. "which shews this Water contains no Proportion of common Salt; now
Oil of Vitriol dropped on common Salt, raises a very great Effervescence.
Take this Hint once for all, that whenever he separated the Earth and Salt,
then found the last Ferment with Oil of Vitriol, it's an alkaline Salt with
him, when in Truth it's a certain Mark of common Salt; and this Mistake
^e p. 5. he could not avoid except he had crystallized the Salt. He says, ^e "the
"Virtue of all purging Waters depend upon a certain neutral cleansing
"Salt." But the Waters of Swalback ferment with Acids, are therefore
^f p. 72. alkaline, and yet purgative; ^f but this Quality depends upon his Philosophy,
viz. the fine mineral Spirit, and subtile irony Principle; but let him se-
parate the Salt, and if it purge with the other Principles, and his Philo-
sophy into the Bargain, except drank in unreasonable Quantities, I will
own my self fairly in the Mistake; or otherwise all these Waters highly im-
pregnated with a mineral Spirit and irony Principle, but very little Salt,
should purge, which is true of none of them. He is very sanguine against
^g p. 104, 105. the Existence of solid or fixed Vitriol in Mineral Waters, ^g "is positive it
"can be proved by no Arguments nor Experiments, that a Grain of it can-
"not be procured from a hundred Pints, and to assert the contrary is an
"Errour in the Examiner from his want of Knowledge in Chymistry." It
might be a sufficient Answer to this, should I say, I know of no Diffe-
rence betwixt fixt and volatile Vitriol, but the smallness of their Parts,
one consisting of such small Particles as are capable of Elevation in the
Air, either upon being long expos'd thereto or warmed by the Fire; the
other being grosser endures the Force of Exhalation or Distillation, but
the Principle is the same; but more directly, there are Mineral Waters
which contain fixt Vitriol, a pregnant Instance whereof we have in Malton
Waters, and all the coal Waters in this Country contain fixt Vitriol only.
And

And as there are different Degrees of Volatility of this Principle to be met with in Mineral Waters, I do not apprehend the Absurdity of saying it sometimes exists in so large Particles, as to endure the Force of Heat in Exhalation. No Physician can be presumed ignorant of the Usefulness of Sulphur and Steel in Medicine, and Vitriol is acknowledged a Composition of those two; why then must it be so injurious when fixt, and yet so advantageous when volatile? I can assign no other Reason than that one fits easier upon the Stomach, goes sooner off and invigorates the Body more sensibly than the other. He had told us before ^a "that if any Vitriol" p. 51.
 "remain behind after the Evaporation of the Waters, it may properly be
 "called fixed; and indeed there are some chalybeate Waters which afford
 "a very minute Parcel of this fixt Vitriol, obtainable by a particular
 "Encheiresis". Hereby I suppose he means that of putting steel Filings into
 the Water before it's warmed. This I tried with the light Chalybeates,
 but procured no fixt Vitriol this Way. But how are we to know the Water
 that has this fixt Vitriol, "they turn Inky, not only with Galls, but even
 "with Oak-Leaves, Pomegranate Bark, Extract of green Tea, &c. But
 this is too great a Concession to be stood to: Afterwards he tells us another
 Story; ^b "but for a fixed Vitriolic Salt, capable of enduring the Fire (by" p. 146.
 "heating only) no such thing is to be found in mineral Waters"; here he is
 obliged to Dr. Lister, who having inadvertently laid down this Assertion,
 how is he perplexed about Malton Waters, where he finds fixt Vitriol?
 Then rubbing the Vessel with a Plume of Alum must salve the Mistake; but
 if you carefully crystallize the Salts of that Water, you shall have plenty of
 Nitre, and Vitriol in Bubbles lying between them, but not a Grain of ma-
 rine Salt: But if they contain no Vitriol, or if the Nature and Opera-
 tions of volatile and fixt Vitriol are entirely different, ^c "or if the first is" p. 105, 106.
 "really somewhat of an irony Nature, which joyned with a sulphureous
 "Spirit, resembles common Vitriol only in Taste and Colour, without any
 "farther Approaching to the Nature thereof"; how is it that Harrigate
 Alum Spring (falsely so called) has under it's Basen between the Clay and
 Moss, several Cart-Loads of pyritical Concretions, bred purely from the
 Ouzing up of this Water: which Transudations have petrefied the Moss,
 withered Grass and stick Roots, but powdered and infused in warm Water,
 a great Part is dissolved down to Vitriol, and yet the Water presently loses
 it's tincturing Property with Galls. "In Fact there are very few hot
 "Springs that contain Sulphur at all, and except one or two there are
 "not the least Marks of it discoverable in the rest; ^d and he has with the" p. 156, 157.
 "utmost Exactness examined such Waters as run hot and with an abo-
 "minable Stench like that of rotten Eggs, but never could discover the
 "least Grain of Sulphur in them. It's Marcasites therefore ^e abound plen- p. 140.
 "tifully

"tifully in the Earth and consist of Iron and Sulphur, wrought into a
 "Mass; it's obvious to conceive that a large Bed of them lying under
 "Ground, and being moistened by the Water that runs over them, will
 "produce a Dissolution of the Principles whereof they consist". Well; if
 the Marcasites which heat the Water, consist only of two Principles, and
 these two are not separated but both dissolved, what's become of the Sulphur
 and Vitriol? why are they not brought to us by and in the Water; or what
 other is it than a sulphureous Principle that gives the Water this fetid dis-
 agreeable Smell, as well as the Vitriol gives them this rough harsh Taste;
 or whence came the several Pounds "of sublimed Flowers of Sulphur stick-
 "ing to the Arch and Top of the Well-Room of Aken, or at Aix la Cha-
 "pelle". &c.

That learned and indefatigable Investigator of Nature, the honourable
 Mr. Boyle, in his Essay towards a natural History of Mineral Waters,
 seems to have given the greatest Discouragement to the Naturalist's Work of
 examining their several Properties; for by his Methods a considerable Part
 of human Life is scarce sufficient to examine one Spring; and after all he
 alledges "an Investigation of them to any Satisfaction, little less than both
 "impossible and impracticable; he lays in the Way such Bugbears and fright-
 "ful Apprehensions, innumerable and insuperable Difficulties, Hopelessness
 "of Success, Deepness of the Recesses, Profundity of the Abyss, unsearcha-
 "ble Mixture of infinite Variety of Matters and Bodies, endless Combina-
 "tions, Compositions and Intermixtures thereof, Greatness and Expen-
 "siveness of the Work, &c". But if we attend a little more closely, we
 shall find several of his Requisites unprofitable or foreign, as well as tedious,
 and that he is frightful and apprehensive where there is not the least Cause
 of Fear. What could possibly discourage a Man more, than to be told by
 so great a Person at his first setting out, * "that there are beneath the
 "Surface of the Earth divers mineral Substances, some fixt, and some
 "volatile, some in Form of hard Bodies and some of soft ones; some of Li-
 "quors, some of Fumes, divers of which the Generality of learned Men are
 "Strangers to, besides those that tho' some Men may have chanced to have
 "seen, have their Natures so little known, that they have not so much as
 "Names assigned to them; so that considering the Ingredients we are un-
 "acquainted with, (to pass by all the rest that the Earth may conceal)
 "the Proportions wherein they are mingled may be numberless, and the
 "Qualities resulting from those Commixtures may be very different from
 "those of the separate Ingredients; so that the Difficulty of securely deter-
 "mining the Effects of Mineral Waters a priori, is little, if at all less
 "than insuperable to human Understanding"? This certainly carries great
 Weight with it, especially considering from whence it comes; and the
 Difficulty

* Sect. 2.

Difficulty is started from the Impregnation of Waters with mineral Substances, of different Kinds, Consistency and Commixtures. But it's worth our Inquiry whether these Substances, in their natural State, are dissolvable and commiscible with common Water, or not; or whether any or all of them are dissolvable? are they dissolvable with or without a Medium? have all the Metals, Minerals and Fossils through which the Water is strained and by which it's impregnated, been searched, known and examined? are their Effects, whether separated or combined, known upon human Bodies? sure it's not impossible for human Understanding to find out and determine these. If they are such as are indissolvable, it may indeed be puzzling to human Understanding to find out that in Waters which never was, and cannot possibly come into them: Or are they such Substances as are only dissolvable by the Help of a Medium, Menstruum, or third Body; is that third Body there and what is it? But his Error lay in imagining Bodies dissolvable which are not, as Gold, Silver, Tin, Lead, &c. and in apprehending there might be more Dissolvents than really are, for we find none besides Vitriol. The Water indeed wears off and carries away in it's Bosom some Part of the Bodies of a looser Texture, as of Earth and Stone. But these are visible upon Exhalation: For Nitre and Sea-Salt cannot dissolve Metals, before those Salts by Chymistry be changed to an acid Spirit. From a Fear that Mineral Waters might be impregnated with Orpiment, Arsenic, and the like poysonous Minerals, which really are not natural but artificial; for kind and wise Providence has so order'd it, that if there should be dangerous Minerals in that Earth through which those Waters are strained, yet while at Rest in their natural State, they are indissolvable, and therefore cannot hurt. Some Historians, as Pliny, tell us of Waters that fuddled the Drinkers; but this is common to all such as are richly impregnated with a mineral Spirit. They tell us also of other Waters that kill; and this some may do without any Poyson, as when they abound with a mineral Spirit and a chalybeate Principle at the same Time, if drunk immoderately, in hot Weather especially, they may rarify the Blood, and in sanguine Constitutions occasion Fevers and Hemorrhages. Strong purgative Waters may cause a Superpurgation; a Case which we have several Times seen: Waters impregnated with Vitriol or Copper, a Vomiting; but this is excluded the Class of medicinal Mineral Waters: Hot Sulphur Waters a Fever and Death. Yet here is no Poyson in all these, farther than Want of Judgment and Discretion in the Drinker. I know it has been a common Thing both with Naturalists and Physicians, to impregnate Mineral Waters with imaginary, not real Principles; and have scarce left a Metal, Mineral or Fossil, which some Spring or other shall not contain: Hence, are they in continual Fear about their Effects, and in the utmost Uncertainty about

^a De Arte
vitraria.

^b De Sul-
phure.

about their Uses and hurtful Consequences, when in Truth it's their own fruitful Fancy, not Nature, that impregnates them with Poysons; for all owning Arsenic, Orpiment, (or if there are any other more frightful Things than those) to be in the Bowels of the Earth, through which our medicinal Water is strained; yet since the Former of all things has so order'd it, that the Water neither dissolves nor imbibes any of them, but as tho' it were indued with a rational deliberative kind of Choice, it only dissolves of its self and brings along with it such Principles and Ingredients, as are highly conducive to the Health of human Bodies. But let Orpiment and Arsenic be as dangerous as they are represented, yet they were always owned to be so when given in Substance, not in Infusion or Tincture drawn in simple Water. But finally to put the Matter out of Doubt, hear Kun-
kelius, ^a and Boerhaave in his Chymistry, "^b Auripigmentum
" shews its self in several Things like Sulphur, it's friable, fusible, easily
" inflammable, has a sulphureous Smell tho' no volatile Acid, inert, inno-
" cent, not injuring the Bodies of Animals, as is vulgarly reported and
" believed, becomes red by Fusion, and then, but not before, discovers a
" volatile emetic Quality; it's improperly called yellow Arsenic. This na-
" tive Auripigmentum fused in a close Vessel on the Fire, gives a friable
" Mass, and easily may be reduced to Powder, of a Minium Colour, not
" very sharp, nor so very poysonous; this by both Ancients and Moderns is
" called Realgar, red Arsenic, Sandarach, &c. Which Confusion of
" Words has occasioned several Errors, but the present white crystalline,
" ponderous, friable Arsenic, that's sold now, has not been known above
" two hundred Years, and is an artificial Body; for whilst the Fusion of
" Cobalt with a fixt alkaline Salt and Flints is preparing for Smalt, the
" ascending Flower gives crude white Arsenic; which put in a close
" Vessel and fused in a strong Fire, yields the Arsenic sold in the Shops; but
" if this Flower of Cobalt be fused with a tenth Part of common Sulphur,
" we have the yellow Arsenic of the Shops; which should be carefully dis-
" tinguished from Auripigmentum, seeing it's irresistibly fatal; but when
" the same Flower of Cobalt is fused with the Mixture of one fifth Part
" Sulphur, this produces our common red Arsenic; and for the same Rea-
" son should be well distinguished from that of the Antients: Wherefore our
" Arsenic resembles not Sulphur so much, but has a peculiar Quality pro-
" per to its self only, unknown to the Ancients, fatal to all Animals, and not
" referable to any Genus of known Bodies". What does it amount to if
under the Earth's Surface should be hid ten thousand times more Metals,
Fossils and Minerals, and these ten thousand Times more compounded than
they are, when I am satisfied that few of these are dissolvable in Water,
and that these few are investigable? If by Effects upon human Bodies, he under-
stands

derstands their particular Manner and Degree of Operation, I shall join with him; for allowing a Man should know both the Kind and Quality of Salt impregnating Mineral Waters, yet it is difficult he should precisely determine the Time, Manner, and Degree of their Operation either by Stool or Urine; this is not what we pretend to in the Use of the best known Catharticks and Emeticks, or Diureticks. But if he mean that it's impossible to determine before hand, whether the Alterations these Waters shall make upon the Body, by their Operation or Alteration, shall be good or bad, hurtful, advantageous, or neutral, when I am apprized of their Nature, from an Acquaintance with the Kind and Quality of their fixt and volatile Parts, and have the Case and Constitution of my patient plain before me; I must beg leave to be excused, if I think it not humanly impossible to tell, whether the given Water will be of Service or not. But what follows ^a might^a Sect. 4. be one Cause of leading our Author into this Mistake, where he says "the
 " Experiments made on Waters after they are taken out of the Spring, is
 " what's most wanted by Naturalists and Physicians, and the most instructive to them, and to make these, it's not necessary that a Man repair to
 " the Place, but may at Leisure examine the Water at Home, where he
 " has Conveniencies." But why not necessary? he sure did not consider that the Spirit and volatile Principles of Mineral Waters, are by far the most effectual Parts, and it's impossible to carry those away from several Springs. Bristol, Buxton, Matlock and Stony Middleton Waters had lost them when they came at my House; nay several Waters lost their finest Principles, by carrying them a little Way, and keeping them only a short Time. Scarborough at the Spring head weighs lighter, strikes a Purple with Galls, and is more Diuretic; but when carried sixty six Miles in close corked and well sealed Bottles, and laid only three Nights by the Way, Galls turn'd it of a muddy pale White, and in one Night's Time turn'd it Green throughout: Here both its Spirit and Chalybeate Principle were gone. Ranfield Spaw chalybeate was quite lost in three Hours and six Miles carriage. Long Addingham and Carleton lost theirs in twenty four Hours. All the simple Chalybeates, which in many Cases are the most Powerful and Successful, being impregnated with a volatile Vitriol only, a little Ocre, and perhaps not a Grain of any Salt in two Gallons of them, yet by Carriage they lose most if not all of both Principles, and then they are worse than common Water, very unfit for medicinal Purposes, or to pass an Examination of them at Home. The Reason of those different Degrees of Volatility of the vitriolic and sulphureous Principles, seems to be, as the acid sulphureous Spirit exhaling is weaker or stronger, and the vitrioline Particles are grosser or finer, lesser or greater, and the Connection of those two is closer or looser, so the Principle produced from this Exhalation will be more
 or

or less Volatile. Hence I have observed that the slowest or weakest Chalybeates, or Sulphur Waters, abound most with the more permanent Chalybeate or sulphureous Principle. It requires a great deal of Patience and Nicety to discover the chalybeate Principle in Matlock Waters at the Spring Head, but impossible when quite cold. Kedleston is the strongest Sulphur Water in Derbyshire at the Spring, but when carried only five Miles and kept one Night in a clean well corked Bottle, its Smell was much weakened, nor would it change a Chalybeate Water to a purple Colour, tho' it did it in a Moment at the Spring Head: On the contrary, some Waters contain some Principles utterly indiscoverable, either at the Spring Head, or at a distance, before they are arrived at the highest Degree of Putrefaction they are capable of; thus Scarborough discovers not its Sulphur till then. He says, "the Acidulæ, so called from their acid Taste^a, are what he's most conversant in; but I have not been able to discover the least Acidity in any of them, Coal Waters excepted; but the rough, harsh, Irony Taste of these Waters, has always been taken for an Acid. Scarborough Water e. gr. has by all been said to be possessed of an Acid; but let it stand a few Hours, till its vitroilic Principle be gone, and its a saltish sweet Taste, the same with a farrow Cow's Milk^b: nay their turning green with Syrup of Violets, their Ebullition with strong Acids, and their intolerable Putrefaction on long keeping, are Characters utterly incompatible with any Acidity. But their curdling Milk and Soap, has given a Handle to this Notion of their being of an acid Nature; but do not all Salts the same, when Water is full of any of them, even Sea Salt itself, tho' it ferments with Acids, and is therefore called an alkaline Salt by such as had not Patience to crystallize it, and therefore "will have it to proceed from the mineral Spirit these Waters contain, which by means of its latent Acid, joining itself "with the calcarious Earth they abound in, thus degenerate into a "Salt, resembling alkaline Salt^c &c. and then confound it with a volatile Nitre. He says, "Miners have met with running, as well as stagnant Waters, some "whereof have been mischievous, as corrosive, petrific," &c. True, where Nitre and Limestone abound, there may Petrefactions be found; but for natural Corrosives, I know of none such, except Vitriol deserve the Name. But that the Waters in the Bowels of the Earth, where Men are at Work are changed, is no Wonder, when Pieces of Minerals, Metals, Fossils, Salts, Stones and Earth are in Substance mixt with the Waters; but what is this to Natural Springs? People are not to drink out of Soughs and Levels. Wirksworth in Derbyshire formerly had a very pleasant, pure and wholesome warm Spring, yet in tearing to Pieces the Bowels of the Earth in search of Lead, they lost both that, and most of their other Springs, and have now two warm Brooks, being old Soughs made to drain the

^a Sect. 5.

^b A Cow's Milk that's near Calving.

^a Hoffm. p. 143.

^c Boyl. viz.

the Water from their Works, which still bring abundance of small Lead in them, tho' the Works there have been ended many Years ago. As to the Climate and Latitude in which Mineral Waters spring up, the carrying and use of a Quadrant may satisfy the Curious; but they will meet with the same sort of Waters in different Latitudes. As to the Quarter of the Heaven, the Height or Depth of the Hill, Mountain, Valley or Marsh, where the Mineral Water springs up, these are very trifling; the principal Use of these, seems to be to recover the Spring again if lost, and therefore the Examiner should be exact in this to a Foot. As to subterranean Fires with manifest Chimnies, with or without Flowers of Brimstone, we have none, therefore seek after none, having traced some of our warm Waters to the Spring Head under ground. As to the jundry tedious Ways of Distillation, we know that the common volatile Parts will fly off every one of them, the Heat further rarefying and volatilizing its Parts, more than Carriage or close keeping; therefore all we have to expect from this trouble, is perhaps some little grosser Sulphur, or a little Vitriol, the first discoverable from its yellow Colour in a Receiver, the last from its turning Purple with Galls, both which are as certainly discovered with less Labour. As to Tryals by Ignition, Reverberation, Elixation, &c. these only assist in discovering the Metal or Earth mixt with the Water; and if there is any great Knowledge to be gained that way, it may be had at much less expence: And as for Metals, I will answer for it, they shall meet with none, except Iron or Copper, and these we hope to discover with less Fatigue and Cost; as to Arsenic, they may spend their Days about Fire and Furnaces, and not find that. And by these violent Methods, the Salts, if still mixed with the Earths, will be spoiled. As to the Taste of Waters, I lay aside his vinous Acid, acerbous and bitter; being out of hopes to find any medicinal Waters of those Tastes. The other Tastes must be expected to vary from Carriage, long keeping, warming and cooling again, freezing, being negligently or carefully corked up, &c. As to the Colour and Quantity of their earthy Contents by long standing, distillation, several boylings, &c. quorsum hæc? all this is done at once by boyling them slowly in a clean Vessel, over a very clear gentle Fire, and carefully observing how and what Sediment they let fall, and what seeming Proportion this has to that after boyling.

The next Writer of considerable Note is Dr. Martin Lister; he was an excellent Naturalist, and seems to have been encouraged by the Royal Society, upon the great Dispute that had happened about the Scarborough Waters: His main Design was to have discovered the Genus of impregnating Salts in the Gross, and had his Application been equal to his Capacity, we might have expected greater Things from him; but he being no great Favourer of Mineral

Mineral Waters, contents himself with a slight Examination of those, chiefly about which the late Quarrel had happened, viz. Scarborough, Malton, Harrigate, Buxton, and Knaresburgh dropping Well; from these he draws a Conclusion, "That all the Medicinal Springs of England, tho' almost infinite in Number, yet contain only Lime-stone-salt, and common Salt. Vitriol they have none. The stinking Waters contain only common Salt, and nothing besides a sulphureous Vapour or Halitus, only occasioned by the Pyrites, for the Water stagnating in its subterranean Channels upon the Pyrites, acquires this Smell, and all those Springs are either of a very slow Course, or stagnate." Now this Pyrites is all sorts of Iron-stone; it consists of Vitriol and Sulphur only, and it's wholly dissolved in the atramentose Waters, and yet these Waters contain neither Vitriol nor Sulphur, except only a bare Vapour. Here is Cunning indeed, that carries off the Solution and not the Solvent. "Were Sulphur Waters kept often upon the Pump, and much drawn, they would not stink at all; for it's their Stagnation that's the Cause of their Smell; and all Acidulæ, the Atramentose especially, if they are kept bottled up for some Time, send forth the same sulphureous Smell, as Harrigate Sulphur Water; but yet all these kind of Springs have a whitish Flower on their Surface; and this Flower is Sulphur, their Stones are died Purple, and their Waters turbid and muddy". This is strange! Sulphur, yet no Sulphur; a fetid Smell from Stagnation; a mere Halitus, and yet a visible, palpable Substance; and all from the Pyrites, a Name without any definite Signification, what was formerly called the Firestone, or Stone upon striking with Steel, threw forth sparks of Fire; but now alienated to ten thousand different Bodies, every Substance containing Iron, being so called by him; and in this Sense, Coal, Hopp-ashes, Clay, and by his own Words the Calculus humanus is a Pyrites; a strange Confusion of Terms! But the Pyrites is the most monstrous Creature, being it dissolves, annihilates and regenerates it self, is the Cause of chalybeate, stinking, purging, hot, tepid, and all other medicinal Springs, is dissolved in them all, and yet affords neither Vitriol nor Sulphur, tho' it consist only of those. It's the Cause of Thunder, Lightning, Earthquakes, Meteors, Ignis fatuus, &c. &c. &c. for Time would fail me to recount all its Feats. It and Lapis calcarius or Limestone, are the only Stones, that since the Creation, have, are and will be generated to the End of Time. Its Waters purge, and yet it's the Nitrous that open the Belly; for tho' dissolved, yet it exists not in the Waters, but yet it Purges us in them. As the Doctor was prejudiced against the Use of Mineral Waters, so we have Reason to fear he trusted too much to the injudicious Tryals of negligent ignorant Persons; or that his Experiments were to support some preimibed favourite Hypothesis, viz. either to magnify the Wonders of the Pyrites,

Pyrites, or to expel the Existence of Vitriol out of Mineral Waters, or to place Iron in the Calculus, or to depretiate the Waters, and put Men out of conceit with so cheap, safe, palatable, and efficacious a Remedy; a Remedy contrived with infinite Art, of extensive Use, and a Pledge of great Commiseration and Kindness to the feeble, infirm human Race. I would neither be partial in their Favour, nor conceal their Efficacy, but speak Truth, be just to the Great Donor, and the infirm sickly User. And allow me to affirm, that whoever attempts the Examination of Medicinal Springs for the support of a received Opinion, whenever his Reason gets at Liberty, he will find himself deceived, Nature misrepresented, and Mens Judgments imposed upon; for I am satisfied that the Defence of some darling Notion, Interest, false Comparisons, inconclusive Arguments, improper Methods, injudicious Experiments, too great Credulity, and want of personal Diligence and Presence, have hitherto been the chief Causes of the Misrepresentation of Mineral Waters. Every Enquirer should be upon his Guard, and throw off Attachment or Prejudices in favour of a preconceived Opinion, and beware that he take not things upon Trust, from the credulous ignorant and unexperienced; nor acquiesce in Philosophical Speculations, without plain and undeniable Demonstration, nor be carried headlong with the generally received Opinions; let him act the Part of an Impartial Historian, regard Truth, attend to Nature and her Discoveries from simple, easy and uncontravertable Experiments; then, and not sooner, he stands a fair Chance of succeeding to the great benefit of Mankind, and pleasant Compensation of his Labour. That Dr. Lister has made but a slight Examination of several Waters, is evident from his Accounts of Scarborough, which he says, contains nothing besides Limestone-Salt, Ocre and White-Limestone-powder, here it's Sea Salt is quite overlooked. He says Long-Addingham, Broughton and Cricklee-Grounds Waters are all Sulphurous, and contain only Marine Salt: now the First of these never had any Sign of Sulphur in this World, being a very fine, light, small Chalybeate Water; ten Gallons whereof will not afford a Grain of Salt, if I may be permitted to conclude from my Trials of it. Broughton contains chiefly Marine Salt, with a pretty deal of Nitre. Cricklee-Grounds Water, yields a great Quantity of both Nitre and Marine Salt; the first Crystalizes in 10 or 12 Days time, and the other afterwards. He says "Four Gallons of Buxton Water afford a Scruple or two of Salt; without any Stone-powder; but we shall find it otherwise; this Salt he will have to be mostly Marine Salt, but this is an Error, as we shall see. Malton Water with him, contains only Limestone-Salt, and powder of Limestone, with some Plumose Allum; but had he laid aside his favourite Hypothesis, he would have found his Alum to be Vitriol. The Crystals of his fifth natural Salt, or

Limestone Salt, which generates spontaneously both in the crude Limestone and old Lime Walls, and of all other fossil Salts is the most plentiful, it's Crystals, he says, are long and slender, with four Parallelogram and somewhat unequal Sides in the middle; but of all the Nitre that I have obtained from a great many Waters, the Crystals had all six Sides, each two being equal and opposite, as represented in several of the Figures. I have several Times, unsuccessfully attempted to procure Crystals from both crude and calcined Limestone; a very strong Lixivium I did obtain from old Lime out of a Chimney, but not one Crystal upon ten Weeks standing, but it's still in a fluid State, and intolerably thick and Salt. Come we now to our Author's Effects of Mineral Waters upon human Bodies. "The cold
 "stinking salt Waters, the nitrous atramentous and nitro-atramentous, are
 "all Lapidescant; ^a the Warm Salt nitro-atramentous, and the cold sul-
 "phur Waters, all excite violent Thirst, Vomiting, burning Heat of the
 "Stomach, a Diarrhœa often continuing several Months, nasty Eruptions
 "of Pustles over the whole Body. Cold nitrous Waters, wherein Lime-
 "stone Nitre is mostly immature, make the Body costive. Cold nitrous, or
 "nitro-atramentous Springs where the Limestone Nitre is mature, less of
 "the Stone and some little Ocre, or abortive Vitriol; these Waters occasion
 "a Vertigo, as in slight Drunkenness, a sudden watery Looseness, without
 "Pain or Gripes, a small or no Thirst, a greater Appetite for a few Days,
 "much red Sand in the Urine and sometimes Stones, even in such as never
 "had Sand, Gravel, or Stone before, and sparkling saline Particles in the
 "Urine, and this often continues several Months after drinking the Wa-
 "ters. A sharp poignant Pain in and about the Arms from the Sharpness
 "and Acrimony of the Salts. And if they continue to drink the Waters
 "too long, they frequently cause a Fever. The Quality of the Ingredients
 "impregnating our Mineral Waters, is, in one Word Petrefaction; for
 "both the Pyrites and Limestone being unconquerable by our Stomachs, and
 "both being in their growing State are lapidescent, for these are the only
 "Stones that since the Creation do generate; they petrify Animal, Mineral,
 "and vegetable Bodies, and in this Sense all Waters are Medicinal, but
 "much more Mineral Waters, &c." Thus you see all Waters breed the Stone,
 and the more they dispose animal Bodies to this, the more medicinal. Hence
 such as petrify Birds, Beasts, Plants, and Parts of Men are the most
 medicinal; and tho' impregnated but with few Principles, yet these are
 mischievous enough: Nor have we reason to complain that nature has been
 niggardly in her Distribution, for had they contained more, probably they had
 been so much the more pernicious. Let such as are liable then to the Jaundice,
 Stone, &c. look out for another potable than Water or any thing produced
 of it; and it's some Comfort that we have other Fluids beside, viz. Air,
 Light,

^a Differtat.
alter c. 2.

Light, and Mercury, chuse your Tipple out of those three, and be thankful, since Nature has poisoned the fourth Fluid, Water. As for the Virtues of Mineral Waters, " he would rather learn these from other People's Tattle, " than know them from his own Experience and Observation. All Authors " agree that these Waters are good in the Hippo, Cachexy, Scurvy, Stone, " Arthritic Pains, Worms and Sterility." But out of this small Scantling he can only recommend them in the Hippo and Worms; he not only discards their Usefulness in all the rest, but reckons them highly mischievous in the Stone; and still more so in the Gout and Arthritic Pains.

A third Reason for undertaking the present Work is, that here we have many Mineral Waters which never have been tried at all, and yet are of great Repute, as Croft, Stenfield, Aswarby, &c. that may either be equally serviceable with those already examined, or be more useful in particular Cases, and when their Nature and Properties are found out, they may with little or no Expence contribute to the Health of the poorer Sort, whose Business and narrow Circumstances will not allow them to travel to remoter Waters; and also be ready at Hand for the Benefit of the Rich, whose Weakness and Infirmities might render a long Journey troublesome and dangerous.

Fourthly, Many of the Waters in Use have been so superficially examined, that it's impossible to draw any certain Conclusion concerning their Contents, or what they are or are not; and therefore should be more thoroughly searched and sifted. Buxton for Instance, which tho' it has justly maintained it's Character these two thousand Years, yet has there no Pains been taken to discover its impregnating Principles, except what John Jones, (a Welshman, who lived some time at Kings Meadow near Derby) near two hundred Years ago; and a transient Visit made it by Dr. Lister. Matlock tho' much frequented of late Years, yet the World are Strangers to its Contents, tho' some would have us believe that its Virtues are exactly the same with those of Bristol; but offer neither Argument nor Experiment to support their Opinion.

Fifthly, The Wranglings and Contentions of those who have wrote on our medicinal Waters, would tempt one to think that they had not the Discovery of Truth so much at Heart, as the Gratification of a private Humour, or the Support of some favourite Hypothesis, &c. Hence several of them have fantastically impregnated several Waters with Principles of their own Brain, and not those of nature's Bounty; so peevish were they that placing a Word, nay, a syllable different from one another, would occasion a Quarrel, that if one say they contain a nitro-aluminous Salt, another will blot many Sheets of Paper to have it an alumino-nitrous Water, and yet both be mistaken. Never did this litigious Temper arrive at a greater and

^a Phil. Transf.
N^o 35.

^b N^o 49.
p. 999.

more scandalous Height among Gentlemen, than in the famous Controversy about Scarborough Spaw, which at last was taken Notice of and reprov'd publickly by the Secretary of the Royal Society, ^a " who wish'd and thought " it necessary to commit the further and new Examination of this Water, " and the Disputants and their Writings, to a Conjunction of some amicable unbiass'd, able and discreet Persons; and so for the good of Mankind, " regard to Truth, credit of the Spaw, Satisfaction of the learned, disengaging these partial, prejudic'd, unbecoming, inveighing Parties. Thus " would a sincere and impartial Examination tend to the Improvement " of Physiology, to the Relief of Man's Health, to the stocking of the Philosophical Magazine, &c." The Society had before given them a gentle Reprimand and Admonition, ^b saying, " if the Professors of this Art, " would but lay aside Animosities, personal Reflections, and private Considerations, and withal acknowledge as they ought, that new and great " Discoveries might be made by careful Observations and Experiments, " they would easily agree and join together, &c. But this did not do.

Sixthly, Allowing however that former Examinations had been the best and most just, and the impregnating Principles most truly and exactly discovered and described, yet a Re-examination is nevertheless necessary, to know whether the same Springs retain the same Principles, in the same Degree and Proportion, or whether they are changed, diminished, or totally lost, and the Water returned to the State of meer simple Element. For we are assured from several very good Hands, that sundry celebrated Waters have gradually sunk in their Reputation. Several Waters I have examined, which formerly were of very great Note, and had done surprizing Cures, but are now out of Request; nor could I find them differ at all from common Water.

Seventhly, Tho' we had a fair and judicious positive History of Mineral Waters (which is in a great Measure wanting) yet should we find ourselves at a Loss for a comparative History of them; for tho' several Waters are impregnated with the same Minerals, yet some are richer, others poorer, and therefore less efficacious. Some have their Principles less mixt with other Ingredients, whereby they are wholesomer and purer; some contain a larger Portion of mineral Spirit than others. Some are brisker and easier in their Operation than others. Some produce their Effects in a less Time and at a greater Distance; others in a longer time and only at the Spring head; some have their Parts more volatile, in others they are grosser and more fixed. These and a great many other Things render a Work of this Kind highly necessary, and especially now, when Mineral Waters are in so great Reputation and so much frequented.

Eighthly,

Eightly, *There are some Waters especially noted in the Cure of particular Distempers, and did we know the impregnating Principles and Proportions of those Waters, this might give some hint what kind of Medicines are most eligible in those Diseases, where the Waters cannot be got, or their Use is unseasonable.*

Lastly, *Authors have often made every Water a Panacea or universal Remedy, whereby they might justly have rendered them suspected of any Virtue or medicinal Quality; or they have raised horrid Emulations, Competition or Contention in the Minds of Men about them; some have over-valued one and under-valued another, as best suited the Writer's Design and Interest; but had they from clear Proof assigned the primary Virtues and Intentions of each, they could seldom have made the more noted Rivals. Indeed in many secondary Uses, they and common Water are Rivals, as they are among themselves. These are the Reasons of the Publication of this Work; I should now give an Account of the Method I lay down for myself, but a close Attention to what I have already said, will prevent both my self and Reader that Trouble.*

But to all this some may still object, that the Design is out of their Way, foreign to their Study, that they can be nothing bettered nor instructed by it; when they want a Course of Mineral Waters, they must have their Physician's Advice, and they are willing and better pleased to place an implicit Faith in both Parson and Doctor than trouble themselves, or be at any Expence about it; therefore it is not a Work for them. I answer, if your Bodies are exempted from human Infirmities and Diseases, then it's out of your Way, and you are highly excusable so far as relates to Health; but then we hope to entertain our Readers also with some Pieces of natural and experimental History, the Examination of simple, and the Separation of compound Bodies; some Methods of discovering natural Bodies which lie hid in the Bowels of the Earth, some sportings of Nature, &c. And sure these are out of no Man's Road that has either Taste or Curiosity, or that has Pleasure in the Works of the great Architect of Nature: But if your Bodies are liable to the same Accidents and Diseases with the rest of your Species, how can you come at a cheaper Account of your Cure in chronic Diseases, and where is there a safer, more successful and palatable Remedy? and have you no Pleasure in giving Counsel to your poor Neighbours, Relations or Acquaintance? And as to advising with Physicians, I would by no Means have any to enterprize a Course of mineral Waters without his Advice: But is it not often the Case, that the Physician knows as little of the Mineral Waters at a great Distance, especially if they are of less Note and Fame, as the Patient, and yet never the worse Doctor for being ignorant

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ignorant of what he never had an Opportunity to know, or be informed of. And as to the Plea of implicit Faith, this will hold only so far as tallies with their Humours and Interest, and is but a wretched Shift when they want a good Argument, for notwithstanding, both their good natured Parson and Doctor will find themselves hard put to it, to put off a Counterfeit on such Gentlemen instead of a piece of Gold.

INTRO-

INTRODUCTION.

1. **B**EFORE I proceed to the Examination of the Contents of Mineral Waters, it may not be amiss to obviate two Objections which may be made.

First, It's impossible, say some, that these Waters can be so Efficacious, of such general Benefit, and work such surprizing Cures as are pretended; for examine them as strictly as you please, you can never find any Thing in them, besides an inconsiderable volatile Part, perhaps of Sulphur and Vitriol, and a small Scantling of fixt Salt, mixt with some kind of Earth; and all this we can have in a much larger Dose, than by a Course of Medicinal Waters, perhaps of several Weeks or Months; and yet we know, it's odds it will not answer: Besides, do we not see, out of the Crouds of Sick and Valetudinarians, that frequent these Springs, several return as bad as ever, who perhaps never after recover?

2 Answer, This Objection consists of three different Parts, the first whereof is chiefly the Subject of the following Discourse; the second will be answered under the next Objection: So I shall only take Notice of the last here.

That these Waters are not equally serviceable to all must be owned: and also that several never are or can be cured; *i. e.* that some Distempers are of their own Nature incurable; and that Death is the common Fate of Mankind, cannot be denied; but that they are not of equal Benefit in all curable Diseases, may be owing to these several Reasons. First, an improper Choice of the Waters. How many are disappointed of their Expectation by resorting to ineffectual and unsuitable Waters, neither knowing their Difference, nor the Cause of the Distemper? *E. gr.* Is a Man of a sanguine Plethoric Constitution, either as to the Vessels or Humours, and yet has he Ignorance or Boldness enough to venture on

Course of such Waters as are loaded with Sulphur and marine Salt, instead of such as soften, cool, relax and lubricate: May not common Reason tell us that such Waters as heat, rarify and encrease both the Blood's Motion and *Momentum*, are vastly mischievous in such a Case?
or

or is it one whose Blood is too grumous and thick, and its earthy Part predominant over the other Principles, and he flies to a Course of the strong purging Waters, whose brisk Operation shall drain off the serous Parts of the Blood, thicken the Remainder, exasperate the Distemper in all its Symptoms, render Circulation more Difficult; due Secretion and Excretion next to impossible? is this the Fault of the Water, or of him, who without Advice or Judgment has made such a wretched Choice? had he repaired either to the brisk, spirituous, clear Chalybeates; or to the tepid Springs, which have little in them besides a small Degree of Heat, from the Marcasitical Vapour mixt with the Water, he had found what he wanted and desired. Is another under a Cachexy Dropsy, stubborn Jaundice, or *Leucophlegmatia*, and yet trusts his Recovery to the Use of the tepid Waters, and not to the Purging Chalybeates, or those saturated with Sulphur and marine Salt? do some suffer much, and are endangered by a tedious emaciating *Diabetes*, and yet have Recourse to the powerfulest light diuretic Chalybeates, and not to the Lime-Stone Waters. Has any one a Stiffness, Contraction or continual Convulsion in any Part or Limb, and at the same Time contents himself with a Course of the strengthening and not of the warm relaxing Springs? will any wise Man under a partial or general Relaxation, Looseness, and want of Elasticity in the Fibres and Muscles, without gross Obstructions, or a Lentor of the Blood, expect Relief from the warm Baths alone, and not from the cold; chiefly when the hot have preceded: But Mistakes of this Sort are too tedious to be pointed out; and it's very certain they all arise from our want of Acquaintance with our selves and the Nature and Contents of different Waters.

3. But, *Secondly*, Want of Success may arise from an unseasonable Use of the Waters; as in, or after much Rain, when the Springs are weakened with fresh Waters; and at the same Time there is no possible Safety in using Exercise, which ought always, where the Person is able, to attend the Use of Mineral Waters; or in the Winter time, when Perspiration is too small, all the Stress of Evacuation is laid upon the sensible out-lets, and a Cessation of necessary Exercise is an unavoidable Companion at the same Time. The Waters may also be ineffectual from either the Distemper, or its Causes, being mistaken: It's very easy to take one Disease for another; Characteristicks of each are so few, and little observed, and those common; several Maladies are so many, it's not every one, nay, very few that are proper Judges.

4. *Thirdly*, The Inefficacy of the Waters may be occasioned from an irregular Use of them, as, immediately to begin with a liberal Use of them, whether they be purgative or diuretic, when there may be abundance

dance of Obstructions in either or both the first and second out-lets of the Body, as indurated *Fæces*, or abundance of loading *Mucus* in the Intestines, which should have been first carried off by a little Rhubarb, Manna, Lenitive Electuary, Cream of Tartar, *Epsom* or *Glauber's* Salt, or such like gentle Laxative or Mucilage, Sand, Gravel, small Stones, or some Constrictions in the urinary Passages, which required first to have been removed. If such People receive Hurt from such Waters; sure no Man can justly charge them with it, but his own imprudent, or covetous Conduct: Or secondly, he Swallows down an unreasonable Dose at his first setting out, as five or six Quarts in a Morning, and without observing a due Distance of Time, whereby the Water presently reaches the urinary Passages if open; but they not being gradually dilated, in Proportion to the succeeding Deluge, will strain it off but sparingly at first; hence the Vessels of the Body are filled, the Body soon appears as in a Dropsy, heavy, sluggish and disordered: And if this Course be pursued four or five Days successively, he must be sick to such a Degree as will convince him of his Mistake; or if he pours down this Dose upon a Stomach whose Tone is relaxed, and cannot therefore, send it off in any due time, it must be palled to the last Degree, the Person faint sickish and much out of order; or if he swallow this Quantity the first Morning in large Obstructions, if the Waters get into and mix with the Blood, it's suddenly diluted, the Vessels quickly distended, their Spring proportionably diminished, the obstructing Matter driven further on, hence the Obstructions are rivetted. Here appears the Necessity and Skill of a Physician, to judge the Degree of those Obstructions, and suitably to Proportion the safe Dose of the Water to them. A little Oil will make the Fire flame more and burn the brighter, but too much will quite extinguish it. Or thirdly, they may have weakened Nature before they begin, with swallowing down Bolus's, Draughts, Pills, &c. or too strong Purgatives, which is as great an Error as a Man can possibly fall into; for hereby the Stomach is palled, Digestion weakened, the Body and all its Actions unnecessarily enfeebled and that to a great Disadvantage, for in Truth, very little Medicine is required along with the Use of those Waters. A Lenitive when the Body is costive; or an Opiate or Balsamic to relax, when there is an Aftriction on the renal Glands, or Ureters, or saline pungent Draughts, when they are resty and do not answer; or a small easy Emetick, when the Stomach is loaded, will answer a Variety of Indications. Fourthly, when they drink their Water in so scanty a Manner as though it were, or might be, Poyson, or as if they were afraid it should be of Service to them, as half a Pint or a Pint a Day; tho' I own this is the safer Way

to begin, especially when they are doubtful whether the Water suits their Case or not, but it would be next to a Miracle, should this small Quantity answer any valuable Design. Fifthly, others are of so sleepy or lazy a Constitution that they cannot, or will not rise so early to drink the Waters as to have them carried off before Dinner, but refer them to the Afternoon; when the Stomach and Bowels are lined with Food, which must lie for a time between the Water and the Mouths of the Lacteals, and the Meat and Medicine, must be thrown into the Blood together; and to add to the Matter, the Stomach in time of Digestion must have a load of cold Water thrown upon it, or to prevent the Mischief of that, they must content themselves with so small a Quantity as will be of no Service to them, consequently they must either do themselves hurt, or lose the Benefit they might have received. Sixthly, others measure their Dose of all Waters by the same Gauge; thus they will drink no more of *Buxton* and *Matlock*, than they do of *Harragate* Sulphur Water, tho' the last operates powerfully and quickly both by Stool and Urine, and so where the Passages are not plugged up, goes off easily and soon; the former neither being impregnated with so much, nor so stimulating a Salt; as to irritate and force its Way, work rather by their adding to the Bulk of and thinning the Blood both by their Vehicle and Spirit, and relaxing the Vessels. Seventhly, others, tho' able, are yet so lazy, that they will not be at the Pains to walk to the Spring, to drink their Dose, but must have them brought Home, and perhaps let them stand by in an open Vessel exposed to the Air, till their volatile Parts, wherein lay their greatest Virtue, is gone off; and the fixt Parts are often inconsiderable; thus *Scarborough* Water tho' largely impregnated with a fixt Salt, yet weighs lighter, when just taken out of the Well, than when it is carried into the Town, and has stood two or three Hours. *Buxton* Water which contains little beside its Spirit, is much lighter at the Spring Head than when it is cold. To what is this encrease of Weight owing, but to the Exhalation of the Spirit, its Rarefaction going off, and contraction of the Air succeeding? When this Spirit is gone, most Waters load the Stomach, occasion Flatulency and Obstructions in the Bowels; and the more the Water is loaded with mineral Parts, the worse it is: Hence *Buxton* Waters of all others in this Country go off the Stomach soonest, and with most Ease, when it has lost its Spirit. Eighthly, some again, who are able, yet will not use Exercise with their Waters; but we know that such is the present make and Constitution of human Bodies, that even when healthy, they cannot long subsist in that State without Exercise; much less can we expect to recover from Chronic Diseases without it, especially when we are daily taking
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in two or three Quarts of Water or more, which should not be suffered to rest in the Body; and this Consequence is not to be avoided without Exercise.

5. *Fourthly*, An irregular Diet in Meats and Drinks may prevent all the good Effect of Mineral Waters. And 1. Can a Man imagine any Thing more irrational, than for one in a Hectic or Scorbutic Habit of the Blood, to indulge his Palate, with eating aromatic, pungent, saline Pickles, or Sauces to his Meat, as Pepper, Mustard, Horse-Radish, Onions, &c. 2. For another in an Asthma from a stuffing and loading of the Lungs with viscidities to eat, Mushrooms, Cheese, &c. or 3. For those in a Cachexy, Dropsy or Foulness of the Glands, to eat Fish, Bacon, Pork, leguminous Foods, &c. 4. Another in a Hypochondriacism, will eat nothing but drying, earthy, and thickening Things, as salt Meat dryed in the Smoak; and drink restraining or glutinous Liquors. 5. Some whose Vessels are already half shorn away, and therefore have a pale meager Look, dropical Legs, and no Appetite, yet will be so mischievous to themselves as to drink nothing but white Wine. 6. Others again complain of a Coldness of their Stomach and Blood, to warm which, nothing relishes with them but Drams of Brandy or Rum every now and then, not considering that Liquid Fire as well as culinary, dries and parches the Blood, and shrivels up the Solids, when Exercise alone suited to their Condition would do infinitely better; or if there is a real sizeiness of the Fluids, and a Relaxation of the Solids, in the Declension of Life especially, a little warming aromatic Tincture, Infusion, Powder or Pills, taken in the first Glass of Water, would answer their Design much better. But there should be a very sufficient Reason for allowing even this. 7. Some cannot eat at Dinner, and therefore must be indulged a Flesh Supper, this is easily remedied, would not People be too ready to gratify a depraved Inclination; cannot you rise betime in a Morning, ride out after your Waters, and in a few Days, if you can have Patience, I will answer for it your natural Appetite to Dinner will be sharpened, if you keep but good Hours at Night. But let me ask you, do you go to Bed presently after Supper, or do you sit up till it is digested? If the first, is not Sleep a state of general Relaxation of all the Muscles of the Body for two Reasons, 1. To relieve it from the superfluous load of hurtful Fluids in the Body. 2. Place being given to a Succession of fresh invigorating animal Juices or Spirits from the Brain, both to supply the loss of the preceding Days Expence, and lay in a new Stock for the ensuing? Do they, I say, want Restoration and Invigoration daily? And does the Stomach, which tho' a thin Membrane, and yet is the Kitchen and Laboratory for the whole Body, want none? Must it be

continually kept upon Action in digesting your Water one while, and your Meat and drink another, and still be kept on to hard Work at Night; when the other Parts of the Body are relaxed, laid by to rest and supplied with fresh Recruits? And do you expect that it shall then discharge its Office to the best Advantage? That the Chyle shall be prepared in the healthiest Manner? Monstrous! if it be said that they sit up till the greatest Part of Digestion is over, I ask how long this will keep them up, till twelve or one a Clock, will they then in the first Place after this have had Sleep enough, perspired enough, and be ready to rise at six of the Clock to drink the Water? Shall the Chyle of a Supper of such hard Digestion be duly prepared, have all its nutritive Parts separated from it assigned to the proper Uses, and its Recrements strained off in this given Time, considering the Diminution of Action, from the Relaxation of the Muscles, Fibres and Vessels in Sleep, and so the Body prepared a fresh for the Waters? No satisfactory Answer can be given to these Questions. I add further, you came *Valetudinarians*, and are in the best Way imaginable to return such, in Spite of the Waters, to which you set your self at Defiance by these Courses, which proclaim you greater lovers of Luxury than of Health, and beg to be excused from parting so easily and soon with your Indisposition, which begets the Compassion of your Relations and Neighbours: Give me leave to think, at this Rate, you are not only disordered in your Body, but in your Intellectuals also. One would be almost tempted to believe, you came not to seek Help, but pick a Quarrel with and spread a bad Report of the Waters, and in them of the most likely natural Helps.

6. But *Fifthly*, A Meat Supper brings to my Mind, that many are no less negligent in keeping seasonable Hours, in going to Bed and rising: Is it not the Custom of some to invert the Course of Nature, by turning Night into Day, and Day into Night, spending the First (if they can possibly crawl about) in Revelling and Wantonness. Are you in Health or not? if you are, is it your fear that it will never fail, and therefore to get rid of it, you spend and throw it away in a most Profuse and Indiscreet manner; and not contented to injure your selves only, but you disturb those that come not there for Pleasure but Necessity, and therefore would be glad of a very different Course? Is this Humane, to make the Life of others, (the Sick and Afflicted especially,) miserable, their Medicines not only useless but hurtful, and so do all you can to shorten their Days? do you labour under any Distemper your selves? is this the Way to get rid of it? are not Diseases the cause of Death? and do you labour under that which has been the Occasion of the Dissolution of Thousands? and are ye willing and ready to go?

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then why came you here to disturb such as would be glad to find Health? I own Serenity of Mind, Briskness and Vivacity of Temper, are most suitable to a Course of these Waters, but by all means let it be seasonable; and with these Limitations its highly commendable, and contributes to carry off the Waters.

7. *Sixthly*, Take care to keep your unreasonable and ungoverned Passions within bounds: It's enough to prevent the Success of your Course, and exasperate your Illness, and all its Symptoms, if ye do not; for we see even in a State of Health, how hurtful they are. Have not we many Histories, how they have occasioned Palsies, Apoplexies, Fevers, Tremors, and other Nervous and fatal Distempers? how much more mischievous must they be to Valetudinarians and destructive of the Benefit of Medicinal Waters?

8. Therefore that many return from these Waters as bad, or worse than ever, we allow, since we do not expect Impossibilities from them, tho' we often have seen them work unexpected and astonishing Cures. But when through Age, Fury, or ungoverned Passions, or such Meats and Drinks, and other injudicious Use of the Non-naturals as have dried up the Fibres, and so contracted and shrivelled up the Springs of the Human Machine, as they are no more to be made flexible; or where the Obstructions are so great, the Vessels so dilated and weakened, the impacting Matter so thick, as to be for ever incapable of Attenuation and Dissolution, and so the Vessels never to have their Passages opened, nor a fresh vital Stream to pass through them any more; or where a spontaneous Glutinousness of the Juices, together with an irremovable Sluggishness of the Vessels, great Obstructions, and general or particular Tumours or fullness of the Glands happen; or where from the Acrimony of the Juices, Abrasion and insuperable Debility of their containing Tubes, mortal Hemorrhages are poured out into any of the Ventricles: Or where the direct Corrosiveness of the Blood, Mortifications, especially in any of the principal Parts seize: Or where from deep and long Inflammations taking up much Space, filling, dilating, and breaking several Vessels, causing Suppuration and Putrefactions: In these, I say, and many other like Cases, what can Physick, Mineral Waters, or Physicians do? Is it expected they should create and enliven new Bodies? or make and adapt some particular Members to the old? for no less can do here, the old being irreparable, and not long Tenantable; hence we see the Ridiculousness of expecting constant Success from the most celebrated and specific Remedies in all Cases. The Bark will not always do in all Intermittents and periodical Distempers, nor Steel in all Obstructions; nor Mercury in every *Lues*, nor Rhubarb and Ipocacuana
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in all Diarrhæas and Dysenteries; for these Diseases, several of them arising from contrary Causes, are accompanied with different Symptoms and Indications in sundry Constitutions, and will always make the advantageous Use of those Remedies called Specifics, whether Waters or Medicines, the Talent of the studious attentive Physician. In difficult and complicated Cases, especially from these few, and many like Instances we may see the unavoidable Necessity of paying the Debt of Nature sooner or later, by some incurable Disease or Accident, maugre all Mineral Waters and Medicines; and therefore the contempt of these Waters, because they have not always the desired Effect, is not a whit more unreasonable, than if Persons would swear against both moderate and excessive Use of Meat and Cloaths, because all that ever used them before the present Age, are dead, which is making the necessary Supports of Life the certain Cause of Death.

9. Objection the second, But say others, That Medicinal Waters are possessed of such Virtues, and perform such Cures, is neither to be disputed nor denied; but that your few inconsiderable suggested Principles of a Spirit, Sulphur, Vitriol, fixt Salt and Earth, should of themselves in so small a Proportion, produce those surprizing Effects, we deny absolutely; therefore the Investigation of Mineral Waters is to no purpose, for it's impossible to find out and produce those Materials in them, that work these notable Cures.

10. Answer, I yield you are so far in the right, that these Contents considered simply, and exclusively of other Helps, will never answer our Character, nor the Patient's Expectation; and a neglect or forgetfulness of those other Aids has given rise to this Mistake, that because Thousands yearly find those Waters of the greatest Benefit, and we by the strictest search can extract but few Principles, and in such small Proportions, as of themselves can never restore such Multitudes; nay, generally the most efficacious Waters have the least Contents, therefore, say they, we have not, nor cannot find out, what these most noble and sanative Principles are; but if these are not so certainly to be found, yet their Adjutors and Assistants, such as follow, seem to be out of all Dispute.

11. *First*, The strict Regularity, and temperate discreet Use of the Non-naturals, that is, or ought to be regarded on this Occasion: If Intemperance, or any indiscreet Use of those, is indulged, during a Course of Medicinal Waters, they and all other Helps will be but of little Service. What can a Glutton, who is still laying heavy Loads upon the Stomach, wearing out the Tone of it, and the other Instruments of Chylification, more and more vitiating the Chyle, filling

filling the Vessels with thick, crude, and indigested Fluids, daily laying and rivetting greater Obstructions in the small Vessels, indisposing the Blood for parting with its nutritive animal Juices, or rendering them unhealthy, and unfit for those purposes, daily hoarding up new and certain Causes of Diseases and Death; I say, what Success can such expect from a Course of Mineral Waters? Or what great things has he to expect, who, tho' he eat moderately, yet eats either unseasonable or unsuitable Food? as one in a Dropsy, yet will eat nothing but cooling, insipid, mucilaginous Foods, and drink Ale. Another in a Jaundice, yet nothing pleases his Palate, but flesh Meat and Claret; a third in a Scurvy, Leprosy, or other cutaneous Disease, yet hates a vegetable Diet, or will needs prefer the pungent, saline Antiscorbutics. A fourth under great and obstinate Obstructions, or chronic Hyppo, yet feeds chiefly on thickening, hardening, and drying Meats; another has a Hectic, with a vomiting or spitting of Blood, yet loves nothing but such things as encrease both the Blood's Momentum and Velocity, &c. Or what has the Tipler or Drunkard to expect in Reason, whilst he is daily adding fresh Fuel to the Flame of his Distemper? what he contracted by his Intemperance, he is still increasing by the same Measure, or if he is not excessive in Quantity, yet is he indiscreet as to the Quality, gratifying Taste and preferring only such Liquors as are perhaps directly opposite to all the Indications of Cure and his present Course. *E. gr.* One in a Diabetes must have white Wine; or in a Cachexy, Ale; or in the Stone and Gravel, Claret; or a gouty aged Person drinks only Water; or one who has worn out his Constitution with Drams, yet keeps to the fiery Vehicle, &c. or a lascivious Wretch, who has weakened or destroyed the Spring and Strength of his Fibres and Solids, yet cannot forsake the Cause; shall he that has relaxed his Solids by Luxury, Effeminacy and Idleness, and still follows the same vitious or indolent Course, can he expect to reap the same Benefit from those Waters, as he that is regular and uses Exercise? Or shall he that has stiffened and hardened his Solids by much Exercise and hard Labour, think they shall be relaxed again, in a pursuit of the same Course? shall a bad Air spoil a good Constitution, and will he not look out for Waters situated in a better? but these last come rather under the Name of Indiscretion, as the rest did under the Head of Intemperance. O! Temperance! thou Support and attendant of the other Vertues! Thou Preserver and restorer of Health, and Protracter of Life! thou Maintainer of the Dignity and Liberty of rational Beings, from the wretched inhuman Slavery of Sensuality, Taste, Custom and Examples! thou Brightner of the Understanding and Memory! thou Sweetner of Life and all its Comforts! thou Companion

panion of Reason, and Guard of the Passions! thou bountiful Rewarder of thy Admirers and Followers! how do thine Excellencies extort the unwilling Commendation of thine Enemies! and with what rapturous Pleasure can thy Friends raise up a Panegyrick in thy Praise!

12. *Secondly*, That moderate, suitable and seasonable Exercise is not only a great Preservative, but also Restorative of Health to the Valetudinary, is not only consistent with their own Experience, but obvious to all such as consider a human Body, as a Congeries of Solids and Fluids; which, tho' its Contexture be very tender, yet it improves by Exercise, and by Motion and Agitation becomes stronger, healthier and more durable. The Assistance of a general external Motion being necessary to be added to the internal, for the better carrying on a regular Circulation, that immediate Cause of Life. A Discreet Use of Exercise has the greatest Power over the whole Body, and is productive of wonderful Effects in many Cases, where things of seemingly greater Power have failed; for it restores the Tone of the weakened and relaxed Fibres, invigorates, stiffens and makes them more elastic, agile, and strong; first by preventing the Collection and Adhesion of *Mucus* or *Size* on the internal Surface of the relaxed Vessels. Secondly by agitating distending and dilating the Nerves, capacitating them for the Reception of a larger Quantity, and a compacter Apposition of new nutritive Matter, daily carried into and disposed of, in their imperceptible Cavities, which adds Strength and Springiness to the whole nervous System. Thirdly, by attenuating, mixing, digesting and separating the Fluids, fitting them for a smooth and easy Course, along the fine Tubes of the Brain; hence plenty of well-elaborated animal Juices, for repairing the Loss and plentifully nourishing the Fibres; and a fresh Stock of Provision for the next Expences. On the contrary, Idleness and a sedentary Life, relax the Solids, diminish that muscular Force and Action, whereby the circulating Juices are prepared to pass fully and freely, the natural and necessary Secretions of the whole Body, and each secreting *Viscus* is supplied with a due Quantity of Liquor for its natural Use; for the most nutritious Parts of the Blood seem only to consist of the finest earthy Parts of our Food, and a most subtile Oyl; the first make up the solid and constituent Parts of the Body, the last is a Cement for the Cohesion of the Particles of the other. Therefore such as live much on simple terrestrious Food, and content themselves with plain aqueous Potables, have the strongest and healthiest Bodies, containing fewest bulky, relaxing and superfluous Juices. If the Blood is not so fluid and subtile, that its fine Earth and delicate Oyl, may safely and easily pass the smallest capillary Vessels in a due time, it's impossible

sible the Solids should be nourished and vigorous: But the Body must either pine away, as when the Mouths of the Lacteals or their Vessels are furred up, thro' Indolence and want of Exercise, or the Fibres from the Redundancy of Humidities must be relaxed and weakened, through the Grossness of the Chyle and Blood, Diminution of due Evacuations, and Laxness of the Solids from Idleness and want of Motion; the neglect whereof is much more Injurious to the Valetudinary; seeing Indolence unbends, and in some Measure dissolves the nervous System, and produces such Diseases as are the Effect of a lax and weak Fibre, which are of dangerous Consequence and seldom or never cured without Exercise; which as it gives the Body a most delightful Agitation and Sensation, so it contributes much to the frequent Pressure and Assistance of the Muscles to promote Circulation, Digestion, Mixture, Attenuation, and Secretion of the sundry Parts of the Blood, and prepare it for the extream Fineness of the invisible and delicate Vessels and Meanders of the Brain, where the nervous Juice is strained off. Exercise has also the Preference of all Medicines in this Respect, that as the last is generally given to promote and encrease some one Secretion at a time, and it's odds, but whilst it's doing that, it diminishes all the rest; but the first, at the same time promotes all the natural and necessary Evacuations, as well as diminishes the superfluous and hurtful; causes the Secretions and Discharge of those excrementitious Humours, the Attenuation of the Gross, as well as a seasonable and compacter Attachment of the nutritive Parts to the Sides of the decayed Vessels, and thus gradually restores the due Consistence and Mixture of the Fluids, and their regular Circulation, Distribution and Secretion; and removes the weakened and relaxed State of the Fibres, and raises and strengthens their Tension. Seeing then the Advantages of Exercise are so great, it's very properly and necessarily annexed to a Course of medicinal Waters, and may deservedly be esteemed one of the noble Ingredients of that valuable Medicine, and should no more be neglected than the Waters themselves; which it sends into all, even the most remote Parts of the Body; promotes their thorough Operation, hastens and facilitates their Discharge, that they lie not in the Body. But *Fuller's Gymnastics* clear this Point fully.

13. A third Help is the Relaxation or Diversion of the Mind, from its Intentness on its ordinary Business and Study. Doubtless where there is an immoderate Waste of animal Spirits by some Organs, the other Parts of the Body must lose of their due Proportion, and be thereby Sufferers, and have their Strength and Action impaired; especially, when this deep Attention is accompanied with Diminution or Interruption of

due and necessary Rest, with Intenseness of Thought, decrease of Appetite and Digestions, neglect of Exercise, &c. For such a Temper of Mind is much more injurious to Health and Strength, than bodily Labour; for in the last, the nervous Juice is spent, where it ought chiefly to be used, on the Muscles of Action, whereby the Parts have the Spring and Force of their Fibres preserved and encreased, so as Digestion, Secretion and Evacuations are, in a temperate Person, all duely and regularly performed, the Body's waste is speedily and fully repaired, Nature's Ballance is kept up, Health and Life are prolonged. But where the Mind is always at work, and contriving, solicitously searching after somewhat it wants, the far greatest Share of the animal Spirits are spent upon the Organs of the internal Senses, whereby the Instruments of Action are deprived of their due share, and laid by as useless; their Springs fall back and decay; Digestion is performed slowly and imperfectly; Secretions are marr'd and vitiated, from a Want of the Blood's due Attenuation and Mixture; Evacuations, especially Perspiration is diminished, because of the Blood's Cohesion, Grossness and Siziness. This gives us the true Reason why immoderate and indefatigable Studies dispose Persons to the Hippo, and windy Distempers, Indigestion, Disorders of the *Viscera* of the lower Belly, flow Headaches, Consumptions, extravagant Fancies, &c. And why a close Pursuit of this Method often makes them more sickly and short lived than Mechanicks.

This also indicates why it's highly injurious for a Man to employ one Part of his Time in hard Labour, and his spare Hours in intense Thought or Study. For when the Instruments of voluntary Motion cease, and he should rest and supply his former waste, he presently exhausts the remaining Spirits, or wearies out the Organs of his intellectual Faculties. On the contrary, how indiscreet it would be for the close student to employ his vacant Hours in violent Labour at an unseasonable Time, especially, instead of refreshing himself with some pleasing Diversion and Recreation; which might promote and enliven his flow Circulation and invigorate muscular Action and Pressure, without Expence of Spirits; and might attenuate and dispose the Juices for a more copious supply of nervous Juice, such as Riding, Billiards, Bowls, &c. Hence we have the Reason also, why the studious have generally weaker Bodies, unable to bear so much Fatigue, Hardships, and Toyl, as the Labourer. For the first spends his Spirits in considering, brooding over, methodizing, and fixing some Ideas; the last upon voluntary and external Action, or the bodily Organs: Since then too close Application of the Mind either in literary Studies, in anxious Pursuits of the World, Indulgence

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of any of the Passions, &c. do thus impoverish and rob the Body of its animal Spirits; it necessarily follows that there must be an Unbending and Diversion of the Mind attending the Use of Mineral Waters, as well as other Medicines.

14. The *fourth* Assistant, is the Vehicle itself, wherein the Contents of Mineral Waters are brought to us, *viz.* common Water; the best whereof has the most porous or spongy Body; admits or emits Air or Heat soonest into, or from its Interstices; therefore it heats and cools soonest, and has the least Mixture of extraneous Bodies; hence it's the clearest, and contains the least adventitious composition of saline, vegetable Mineral, or earthy Parts to alter its relish, therefore it's the sweetest, or most insipid. Its Gravity is not encreased from those foreign Ingredients, therefore it's of all others the lightest and bears Soap, mixes or boiles with Milk, washes, brews, and serves domestick Purposes the best, being softest; for if it's rough, harsh, and hard, that is, if it's loaded with stony and saline Particles, it's improper for those Uses. But rain Water of all others being freest from those Mixtures must answer these Purposes to the greatest Perfection. Such Water also as keeps longest uncorrupted and is freest from Impurities, sparkles, is brisk and affords most Bubbles on pouring out into a Glass or Cup, is to be preferred. Next to rain Water, is spring Water, especially if it rises out of a fine earthy ascending Ground, and runs upon a pure Gravel or Clay. River Water is next to this. Dissolved Ice and Snow Water, and also all level and drain Waters are by general consent rejected; the first because their Texture is broken and their spirituous Part gone; the last, because they take up and carry along with them Particles of Fossils, Minerals, Earths, Stones, &c. And though Rocks or Beds of Chalk may seem to soften and absorb the Asperities in Water, and thereby better it, yet in Reality they make it harder, heavier, and more unwholesome, by stuffing it with an earthy, chalky Matter; which makes it heavier on the Stomach, and go off more slowly; for these earthy Particles often stop and generate Obstructions in the extream Vessels. Stagnant Waters are by all acknowledged to be bad, because they have lost their most subtile and useful Parts; and in Room thereof have imbibed earthy muddy unctous or other foreign Substances, are become gross, often foetid, and not unfrequently cause Obstructions in the small delicate Vessels of the Body, whence many Diseases proceed. Neither are Well or Pit Waters to be commended, as approaching too near a stagnant State.

As to the Properties of Water, it consists of exceeding small Particles, that it may pass the inconceivable small Vessels of Insects, Animals and Vegetables, whose Food and Nourishment are conveyed to them in

this Vehicle; and all Nutrition is made in the small Vessels, and the Growth and Augmentation of Animals and Vegetables is made at the Extremities of those Vessels, and we are certain that the smallest Bodies of Insects discoverable in Air or Water by the finest Microscopes, are constituted of Myriads of Vessels; all which have their Fluids; the Basis whereof most likely is Water; and probably the Discovery of these Vessels bid an eternal Defiance to human Art. Other Insects doubtless there are, which are almost invisible, these have their Parts and numberless Vessels, and Water still is that Vehicle which must carry Nourishment, into those incomprehensible Tubes; how inconceivably small then must the Particles of Water be? and how absolutely necessary it should be so? but as they are small, so are they of a round and spherical Figure, lest they should touch in more Points than one; for had they touched in sundry Points, their Cohesion had been too great for the delicate Tubes of Animals, but especially vegetable Bodies, to have been kept in Motion; for as Nutrition and Augmentation happen in the smallest Vessels; so do Obstructions chiefly fall out there, from the Languidness of the Motion, Weakness of the Vessels, Grossness, or Cohesion of the Contents, which if consisting of Particles with plain Surfaces, their Cohesion would be vastly greater than their Gravity; and therefore for ever immoveable in the smallest Vessels of the Insects and Vegetables. The Particles of Water are also smooth, whereby they slide one upon another with greater Ease and Readiness; are susceptible of the least imaginary outward Force, to put them in Motion, both for vegetable and animal Nutrition. But tho' they are round and smooth, yet are they liable to the Laws of Gravitation and Attraction, the first whereof exceeds the last. The smallness of its Particles the Roundness and Smoothness of it's Figure, is the Cause, that any collected Body of it is porous, *i. e.* has large Interstices, whereby it's capable of receiving and containing near thirty nine Parts of Air to one of Water; whereby it's adapted to Vegetation and animal Life, and for the Reception of the Rays of Light through or betwixt its Parts. But these Particles of Water are very hard withal, hence they retain a Renitency and Incompressibility, when the Air is exhausted; from which two Properties it is, that the Vessels on the Surface of our Bodies sustain the prodigious Pressure of the external Atmosphere, for had Water been compressible by an external Force, our Vessels next Moment after our Birth, must have had their Sides squeezed together; and all Circulation stop'd at once, or had the Particles of Water been of unequal Figures, Magnitudes, or Hardness, Obstructions would have happened every Moment in the small Vessels of Insects and animals.

Upon

Upon these Properties of Water depend its wonderful beneficial Effects on animal Bodies; which are so constituted as to bear a Resemblance in their Particles to one another; for the Parts of the Blood are also spherical, attractive, smooth and subject to the Laws of Gravitation: Hereby Water mixt with the Blood affects the Solids, removing their Resistance, opening their Canals, rendering them flexible that the other Parts of the Blood may have free course. It acts upon the Fluids, by diluting and mixing their Parts, preventing or disentangling their Cohesions, and *Moleculæ*, which might be the Occasion of Obstructions in the small Vessels, it sheaths, dissolves, and breaks the acrid saline Parts of the Blood, and so promotes and hastens their Discharge out of the Body; it fuses the thick viscid fizy Parts, and yet keeps up their due Magnitude and Tendency to one another; it recovers the natural Resistance of the Vessels, and takes off the Constriction of the Fibres. Water is an Alterative, being the best diluter or thinner of the Blood; the greatest Relaxer, when drank warm, and yet a Constrictor taken cold; and as it's a Diluter and Dissolver, so it is Aperient, and Attenuator; as it dissipates coagulated and stagnant Humours in the Vessels, it's a Discussive, and by encreasing the Blood's Quantity and Motion, forwarding Secretions, hastening regularly the Evacuations, so as the useless superfluous Parts being carried off, the Globules come nearer to contact with one another; in these Respects it's an *Incrassator*, it is a Detergent and Mundifier, by dividing, breaking and dissolving the Cohesion of the thick or fizy Blood: And as it restores the Elasticity and corrugates the membranous Coats of the Intestines, it's somewhat carminative. Water is not only an Alterative, but promotes all the necessary Evacuations of the Body: For drank in large Quantities warm, it vomits: drank more deliberately, in lesser Doses, with Exercise, it purges, especially if *Venice Sope*, Honey, common Salt, *Epsom* or *Glauber's* Salt be added to it: And by diluting, dividing and dissolving the Blood and encreasing its Quantity, it's a good Diuretic; and in a deficiency of Blood or its thickness, or in an unnatural stiffness of the uterine Vessels, 'tis an useful *Emmenagogue*. It's also found by long Experience a safe Sudorific, Diaphoretic, and Pectoral.

Water not only promotes the natural, but diminishes immoderate Evacuations. For cold Water stops vomiting, lessens or cures a great Looseness; is good in a *Diabetes*, or in an excessive Flux of the *Menses*, mitigates profuse sweating; stops a prejudicial Perspiration, and excessive Expectoration, except in old Age. From these Effects it follows that Water is good in Indigestion, and excites Appetite; it's a proper Liquor in an early Gout, occasioned from an intemperate use of spirituous, tartarous, acrimonious,

or

or glutinous Liquors; in a Rheumatism from diminished Perspiration, Siziness or Sharpness of the Blood. In the Stone it's both an excellent Preventive and Cure, while it exists only in a Mass of earthy unpetrified Matter in the Kidneys or Ureters; in a Stiffness or Contraction of the Solids, and profuse waste of the Fluids, from any sudden Passions of the Mind 'tis admirable, and also in Cramps, Convulsions and Madness, its Use is adviseable, (except in old Age, or the Severity and Obstinacy of the Distemper) when the Tone of the Solids is much weakened and almost worn out. 'Tis a great preservative of Health and prolonger of Life, and, except in Persons of lax Fibres, or aged, Water with Exercise clears the Intellectuals, brightens the Genius, and facilitates the Apprehensions; for Wit flowing from spirituous Liquours is superficial and flashy. Water drank with some volatile Spirits gives present Relief in a great Depression from the Hippo, or Hystericks. It eases tickling Coughs or hoarseness from roughness of the Vessels or sharpness or viscosity of the Humours in the bronchial Vessels; 'tis good in sharp Pains, Scurvy, swimming of the Head, or Headach, from a Sharpness, thickness or Rarefaction of the Blood. In a moist Asthma from Cold or debauchery, Water is proper, especially, if a quick Pulse, or Feverishness attend. In a Palpitation of the Heart, I have from Experience both in my self and others, found its wonderful Efficacy when other things failed. In all Inflammations and Fevers, a seasonable and Discreet Use of warm Water can never be too much extolled; in a Heat or Difficulty of Urine from a sharpness of the Blood, in a Hiccup, Abscesses, and Ulcers of the *Viscera*, Obstructions of the Lungs, Jaundice, *Cholera Morbus*, Atrophy, Crudities of the Stomach, Thirst, &c. Water is no despicable Help or Remedy. But having explain'd the Manner and Cause of these Effects more at large in two former Discourses on this Subject, I have barely mentioned some of them here, and must refer my Reader to them for farther Satisfaction; briefly observing here, that Water it self is a Kind of universal Remedy, adapted to most Constitutions, Ages, Diseases, &c. *Hoffman* * very justly observes that the Efficacy of Mineral Waters in opening inveterate Obstructions of the *Viscera*, has a great Dependency upon the Quantity and Goodness of meer Water, however the Mineral runs away with the praise of it.

* p. 5.

But here to prevent Mistakes, which by the Rashness of some, and Credulity of others, have been, and may again be of fatal Consequence, give me leave to add, that tho' Water acts in some of the aforesaid respects in all those Cases; yet I would not be thought to assert or imagine that it does safely so in all Constitutions, or in the same
Consti-

Constitution at all Times: Nor do I propose Water as an absolute Cure, in the above Cases, or to be absolutely depended upon; but only as a Preventive, Mitigator or Shortner of those Complaints, and that which of all other Liquors may be used, at least with the most Freedom and Safety. But still there are a great many Instances in those very Diseases mentioned, wherein the Use of Water only would be both ridiculous and mischievous. *E. gr.* Where they come from the Body's being exhausted or rendered morbid by long Abstinence, too poor and low a Diet, too great Evacuations, long watchings; in Dropsies also; from too great Discharges of the animal Juices, or in a Watery impoverished state of the Blood, with a Relaxation of the Solids. In worn-out old Age, in a fit of the Gout, where the Distemper has left the Extrems and seized the Head, Stomach, Breast, or Bowels; in a relaxed State of the Fibres, and a slow Motion of the watery fizy, poor Fluids. In flatulent Cholicks from a Weakness and Relaxation of the Tone of the Intestines, in Fluxes preceeded by a Cachexy, where the Blood is fizy, Circulation slow, Spirits languid, Skin pale, the Legs or Feet swell and pit. In all white Swellings of the Glands, or in a low State of the Blood, where the Body is cold, and the whole Lymphaticks distended, white or pale, or in all Diseases of the Head; in cold phlegmatick Constitutions, in aged People especially. In Convulsions and Spasms, from want of Blood and animal Juices, as after severe long Fevers, or great Evacuations whereby the Constitution is much impaired and almost worn out. In most moist Asthma's, with several other Cases, too tedious to mention.

Since Water considered as a simple Element, is endued with such noble Properties, of so excellent a nature and capable of producing such surprizing, and some of them contrary good Effects upon human Bodies, what may we not expect from it, when impregnated with a fine Spirit, mineral Salts, Sulphur, Fossils, and a fine Earth, all the free Gift of the all-wise and bountiful Author of Nature? can any thing come nearer a *Panacea*; or is it not rather such in chronic Diseases; especially when its prudent Use is attended with suitable Exercise, Avocation from intense Study or Business, innocent Diversions, and a regular Course of Life; which were the things our second Objector could not find in Mineral Waters, and overlooking which, he slipped into an Error.

15. But after the common Vehicle and Assistants, let us next inquire into the Contents themselves; and first to prevent Mistakes in our search, and that our Expectations may not be frustrated, let us see what things they contain not, *Ex. gr. Sal Armoniac*, though some have sought and pretended to find
it

it in Mineral Waters, yet it being a Composition of Sea-Salt, Soot and Urine, we are not to look for it there. There are also several kinds of Sulphur^a, which we are not to expect to find, nor the *Natrum* or *Natron* of the Ancients;

^a There are several Sorts of Sulphur which we are not to seek after, as 1. *Auripigmentum* which in several Things resembles Sulphur, being friable fusible, easily inflammable, has a sulphureous smell, tho' no volatile Acid, innocent and not injurious to animal Bodies; as Mr. *Boyl* was afraid, and is vulgarly believed: It becomes red by melting in the Fire; and then, but not sooner, it discovers a volatile emetic Quality; from what I said in the Preface we see the Error of such as tell us that Orpiment is only Arsenic of a yellow or Orange Colour, being chiefly found in Copper Mines in a Sort of Glebe or Stones. Its Colour (say they) though always yellow, yet admits of diverse Shades and Mixtures, as golden, pale, reddish, green, &c. From it are prepared red and white Arsenic, the last in common use; its Orpiment sublimed with a Proportion of Sea Salt, the first is only the native rubified by Fire, &c. Nor 2. Amberset, Ambergrease, for tho' the first two burn and flow in the Fire, and consist of a liquid Acid, and fossil Oyl, yet are they solid, neither are they the Product originally of our Climate. Nor 3. These factitious Sulphurs made of Oil of Vitriol, Alum or Sulphur *per Campanam*, united with Oil of Turpentine, and other vegetable Oils; or with Charcoal, Pitcoal, fixt Salts and an inflammable Oil, with such others as Mr. *Geoffrey* invented the Art of composing. Nor 4. That Sulphur called *Oleum Terræ*, this being formed only in *Asia* whose petty Kings keep it to themselves, and what's exported to us under that Name, is prepared from the expressed Juice of the *Cocao Nut* and medicated earthy mixt. Nor 5. *Petræolum* which flows down Rocks from melted *Bitumen*; is thin light and foetid, wholly inflammable, and whenever it swims on the Surface of Waters, is so like distilled

Oil, that many believe it melted by a subterraneous Fire, this differs from Liquid *Bitumen*, only in its thinness and clearness. *Naptha* is a thin, clearer, finer Sort of *Petræolum*, it greedily catches fire, is so retentive of it, that 'tis scarce extinguishable, being the subtilest or finest Part or Flower of *Bitumen*; this Kind of Sulphur is met with in hot Countries chiefly. *Olearius* saw thirty Springs of it near *Scamachia*, in *Persia*. There's a little of it found in the South of *France*, but the best in *Europe*, is that from the Duchy of *Modena* in *Italy*, discovered in 1640 by *Ariosto*, a Physician in a very barren Valley 12 Leagues from *Modena*: Out of the Rock are three Canals dug with great Expence, out of these are gathered into Basons or Reservoirs three different sorts of Petreol, the first white clear and fluid as Water, of a brisk penetrating and no ways disagreeable Smell. The second a clear yellow less Fluid, and not of so brisk a Smell; the third of a blackish Red, and thicker consistence, and a Smell more like that of *Bitumen*. Mr. *Bolduc*, who in 1715 made many Experiments on it, found he could not raise any Phlegm or saline Part from it by Distillation; either in *Balneo Mariæ*, or in a sand Heat he could only raise Oil from it, and at the Bottom of his Pellican remained a very small Quantity of a thick brownish Matter; this Kind of Sulphur is a Remedy ready prepared by nature, being warm and penetrating, of wonderful Efficacy in Rheumatic and Arthritic Pains, and paralytick Limbs: Philosophers will have this to be the Work of subterraneous Fires, subliming the more subtile Parts of bituminous Substances, that lie in their Way. These Parts being again condensed into a Liquor, by the Coldness of the Vaults or Rocks, being there collected and ouzing through Clefts and Apertures which the Ground

Ancients; ^b nor factitious Salts, these being not the Product of Nature, but of human Invention, ^c as *Sal Glauberi*, *Polychrest*, &c. nor vegetable Salts, as Salt of Tartar; nor animal Salt: But to leave these Contents to their proper Places.

Ground furnishes them with. *Naptha* is yet a finer, clearer Bitumen than the last; it ouzes out of several Parts of the Earth in *Chaldea*, especially near the ancient *Babylon*; it's also found in several Places of *Italy*, and *France*, as in *Auvergne* and *Ragusa*. This is soft and black like liquid Pitch, and of a fetid Smell; but that of *Italy* is much Finer, being a Kind of Petriol; whereas the other is chiefly used in Lamps, or for penetrating, resolute and vulnerary outward Applications. *Vossius* has wrote a particular Treatise of it: *Naptha* in *Chaldee* signifies Distillation.

^b Nitre of the Ancients is a Mineral or Fossil, dug out of the Mines of Nitre, says *Serapion*, like those of common Salt; it was formed out of running Water, congealed in its Progress into a Sort of Stone. This Nitre was of four Kinds, according to the Countries whence it came, viz. *Armenian*, *Roman*, *African* called *Aphronitre*, *Egyptian*, which was the most famous of all, and gave Name to the others, being so called from *Nitria* a Province in *Egypt*, which afforded it in greatest Plenty; and he says it was of diverse Colours, white, red, and livid; some porous like a Sponge, others close and compact, others transparent like Glass, and some scaly. But *Geo. C. Schalmer*, *De Nitro tum veterum tum nostrorum*, says the Ancients distinguished between *Nitre* and *Aphronitre*; and says that *Agricola* was mistaken, when he tells us that there was anciently Nitre dug like Stones, out of a Quarry in *Lidya*, *Magnesia*, *Caria*, &c. and that the Nitre used by the Ancients was brought out of several Countries mentioned by *Pliny*, lib. 31. c. 10. A Lake in *Macedonia*, whose Water was nitrous (and yet in the Middle of it was a Spring of fresh Water) furnished the most and best Nitre; it was called *Callustrium* from a neighbouring Cape in the Gulf of *Theffalonica*, and during the Dog Days the Nitre was formed like the Crust on the Surface of the Waters.

The Water of the Lake *Ascanius* in *Bithynia*, and those of certain Springs near *Chalcis*, were sweet and potable at the Surface, but nitrous at Bottom, a Nitre was also gathered in the Ground near *Philippi* in *Thrace*, but it was both little and of no value. The Valley of *Media* also furnished some; and there were Nitre Pits in *Egypt*. The Nitre of the Ancients was drying, deterging and attenuating, was very serviceable in Ulcers, Itch, disorders of the Eyes, Gout, bitings of Serpents, &c. Its use inwardly was to attenuate gross and viscid Humours, but they were strangers to it's cooling Quality.

^c Artificial Nitre or Salt Petre, is of two Kinds, viz. mineral Salt Petre, found in sundry Places in the Kingdom of *Pegu*, and about *Agra*, in Villages antiently populous, but now deserts. It's also found in several Places along the Banks of the *Volga*. It is drawn from three different Kinds of Earth, viz. black, yellow, and white; the best comes from the black, being freest from common Salt, and needs no purifying, for making of Gunpowder. Mr. *Homburg* says all our Salt Petre is either from Earth moisten'd, and manured with the Excrements of Animals, or from old Walls or the Plaster of ruined Buildings, which have been filled with sulphurous Matters, as well from the Animals which inhabited them, as the Soot penetrating them, and the Air encompassing them; the other Kind of factitious Salt Petre, is that prepared from nitrous Matters collected in old Buildings, Dovehouses, the middle of antient Ruins, &c. By means of *Lixivium*, or Lyes made of Wood Ashes, and sometimes of those of Herbs of this Sort, the Arsenal in *Paris* affords us large Quantities: The Nitre said to be in the Air, is only a compound of marine Salt, vegetable, animal, terrestrious and fossil Salts, from pit Coal, and Wood which are volatile; but Nitre is no more volatile than Sea Salt.

16. Whatever the dissolvable Ingredients are which impregnate Mineral Waters, tho' the Materials may be the same, yet are their Proportions often found varying, according to the different Seasons of the Year, Temperature of the Air, and Quantities of Rain: For sometimes great and continued Rains do so wash down and carry off the Salts, and other mixed Substances in the Waters, that they are not only unfit for drinking, but either cease, or at best produce their wonted Colours with Galls or other Ingredients but faintly; especially where either the impregnating Principles lie shallow in the Earth, or the Springs lie low or near some other fresh Water; or where the last is mixt with, or drains into the first. There are several Ways to try whether, or how much such Waters have suffered by Rain or Inundations, or are mended by Drought, as first, let the given Water, when richest of its Minerals be compared with any other Water of the same Kind, with Galls, Tincture of Rhubarb, Logwood, Nephritic Wood, or any other colouring Ingredient; then see on which side the Difference lies, and how much common Water will lower the strongest to bring it to the same Colour or Shade, with the weaker, (both being supposed fresh and genuine, and the Quantity and Strength of the tincturing Ingredients being exactly the same in both) and when you find or imagine the stronger to be weakened by Rain, try how much less common Water it will bear; that is, how much more Water the same Quantity taken up in a dry Season, will bear to bring it to the same Strength with that taken up in a rainy Season. Secondly, put them to the Trial of the *Hydrostatic* Balance, and see how much more they are heavier or lighter than in Drought, for if they are highly impregnated with a Mineral Spirit, they will be heavier after much and severe Rains, but if chiefly impregnated with much fixed Parts, they will be lighter, as these too discover how much its volatile Parts have suffered. Thirdly, exhale any given Quantity, and see how much its fixed Parts are diminished by Rain, or encreased by Drought. But after all, it's not every Rain that hurts the medicinal Quality of Springs, for a moderate Rain sometimes strengthens them, especially after a long Drought, by washing down the Salts into their Channels, which during the dry Weather, might be concreted in the Pores of the Earth, Chinks of the Rocks, or Sides of the Crannies or Channels. Indeed there is no certain standard for the Weight of Waters, being scarce ever one Day exactly the same, but always varying from the Air and Fire contained in them, for as the first is more or less rarified, the Water will be lighter or heavier; the Weight is also varied according to the sundry Proportions of Materials the Water brings along with it at different Times, and from several

several other Accidents, and even the Air it self has no certain standard, for the more or less Water there is in it, the Basis of its Pillar will gravitate more or less on the Surface of the Water, or Body weighed, so that it is impossible absolutely to determine the specific Gravity of any medicinal Spring.

17. Again, it is not impossible, but medicinal Springs may rise up where there were none before; and also that some of one Nature or Property may be changed into another, if First we allow what Mr. Boyle advances, that subterranean effluviating Bodies, have in them a propagating or self-multiplying Power, or a seminal Principle, or of the Nature of Ferments, or what Mineralogists have observed, that some metalline Ores or mineral Earths, are changed, and afford metallic or mineral Substances, which they did not before, or at least not so well qualified or ripened; wherefore some Springs, which were only common Water before, when these mineral Substances are ripened, and some of them continually in *Embryo*, may become medicinal Waters. Secondly, From the deep and inaccessible Caverns of the Earth, wherein are vast mixtures of Bodies, may arise into the Mines, hid under the Earth's Surface, either continually or periodically, great and various Exhalations, which still repair the Loss of those Salts and mineral Substances, which either the Water washes off, or ascend up into the Air, therefore, say they, the Waters are still good. Others contend for some accidental accession and combination of fresh mineral Substances with the former; hence a new Mixture which impregnates the Water with adventitious Minerals, and changes it's Nature. But,

18. It is likewise probable, that some Waters once reputed medicinal, may after some Centuries lose this Quality; hence Posterity may afterwards look upon them as fictitious or superstitious, but with injustice; for at the Expiration of such a Time, the Pores or Chasms of the Earth, which gave vent to the impregnating Principles from the Abyss, may be plugg'd up with solid or other Matter, so as the first is obliged to find or force another Course, and is discharged by some different Outlet. Secondly, They may be altered from combinations with other different Bodies, or by some accident in those deep and dark Recesses, whereof we can give none, or at best a very uncertain Account. Thirdly, The mineral Substances which impregnated those Waters, may be wrought by Miners; or their Spades, or other Tools coming too near the Springs, may have turned them into some new Course, not yet discovered. Fourthly, The former Chasms or Chinks in the Earth or Rocks may be diminished or obstructed by several Accidents, no one of the Division of whose Waters may retain either the whole or some part of the Virtue of the first Spring.

Spring. Fifthly, It may happen from different Bodies acting upon one another, which ceasing, the Success of the Water fails, or from Earthquakes, or other sudden and violent subterraneous Commotions, which shaking or suddenly clashing some parts of the Earth against another, obstruct some Channels, and open others, or from a sudden Inundation carrying down before it that part, where the Spring rose up, or its Minerals were hid, or from some River or Brook changing its Course, and falling into the Spring.

As to the Things these Waters do contain, it is the Design of this Work to search out.

PART I.

P A R T I.

Of the Warm W A T E R S.

A More early Discovery, general Acquaintance, and continued series of Success, for many hundreds of Years, of some of these Waters, oblige us to take them in their Order, and pay our first Compliment to them ; for it's certain, that as to priority of Use or Writings, the *Bath* in *Somerſetſhire*, and *Buxton* in *Derbyſhire*, challenge the Precedency of the whole mineral Waters of *England* ; the laſt without all diſpute having been as well known to the *Romans* as the former ; which is evident, firſt from the Remains of the ancient *Roman* Brickwall about *St. Anne's Well*, which, together with its Baſon, was totally razed in 1709, when *Sir Thomas Deives* of *Cheshire* erected the preſent beautiful Arch over that noble tepid Fountain. Secondly, About thirty fix Years ago, when *Mr. White*, then of *Buxton-Hall*, was driving up a Level to the *Bath*, fifty Yards Eaſt of *St. Anne's Well*, and fourteen Yards North of *Bingham Spring*, the Workmen found buried deep under the Graſs and Corn-mould, Sheets of Lead ſpread upon great Beams of Timber, about four Yards Square, with broken Ledges round about, which had been a Leaden Cyſtern, and not unlikely, that of the *Romans*, or ſome other antient Bath, which had been ſupplied with Water from *Bingham Well*. Thirdly, From the *Roman Highway* from *Burgh* (a ſmall Village Seven Miles Eaſt) to *Buxton*, a great Part whereof remains entire to this Day, and reaches within half a Mile of *Buxton-Hall*, and not improbably it took a turn from *Burgh* to *Caſtle-ton*, two Miles North Weſt, for above this, on the Top of *Maniton*, is remaining a very beautiful and ſtrong Camp. All for two Miles below, is a fortified Station four Square, the Town a Garriſon, and the Caſtle above it a Fort, Armory, or Watch Tower, to answer the Camp. Fourthly, That it was of great Repute in the darkeſt diſtant Times, is undeniable from the Chapel here dedicated to *St. Anne*, whoſe Foundation was likewiſe diſcovered, and a large Piece of its Wall dug up

up in driving the foresaid Level; and no doubt several other valuable Pieces of Antiquity might have been found there then, had there been present any Persons of Judgment and Curiosity.

Buxton-Hall is situated in a very small Valley betwixt two Mountains on the South Brink of the Rivulet *Wye*, or *We*, from the Union of three Springs, a short Mile West of the House, called *I, Thou, He*, which being united, obtain the plural Number *We*. On the North Side of the River, is a steep Mountain covered chiefly with Heath, under which is a black Moss, or peat Earth, below that a Shale, then Clay and Coal, and Lead in some Places, besides plenty of Brasil, and Sulphureous Exhalations, gilding the Subterraneous Rocks like Leaf-gold, Iron-Stone in plenty, and much Sulphur. The Surface here is very barren, and therefore return we to the South Side, which for about two Miles, is a Mountain of an easy Ascent, consisting chiefly of Limestone, which with a coarse Coal got near, is burnt and carried into *Cheeshire, Lancashire*, and the Neighbourhood, both for Building and manuring of Land: I found here no less than nine or ten different Sorts of Limestone, *viz.* a White of a very coarse Grain, another White of a very fine Grain, and a brown Limestone; these are easily burnt, and make good Manure for Grounds, but not so fit for Building, of outer Walls especially; for the Lime being exposed to the Air and Weather, soon moulders and peels off. From none of them unburnt, could I obtain either fixt Salt or Sulphur; these begin pretty high upon the Hill, and run down a good way in Beds under a thin Corn-mould. But lower down nearer the *Bath*, we have a dark brown, a gray, a blackish, and jet black Limestone, and one between a black Marble and a Limestone, whose Grain and Colour take a fine polish. It is both difficult and expensive to burn these, and is seldom done except for building Bridges or Churches, for it presently turns hard after working, and is of perpetual Duration, even more lasting than the Stone it self, neither Air, Time, nor Weather, weakening its Cement; but the Farmers find it inferiour to the first for their Purpose. The three last, either broke or struck with a Hammer, being very full of Sulphur, stink intolerably. Most of the jet black are of a very irregular Figure, full of great Knobs or Lumps, the least Bit whereof broke off sends forth a most insufferable Smell, which sensibly strikes the Nose of the Standers by; it contains much solid *Bitumen*, and seems as though it were forcibly melted Sulphur and Stone Powder, thrown up by the Vehemence of a subterraneous Fire, and condensed under the Earth's Surface, tho' we have no Evidence of any such Fire. A Piece of this Stone taken fresh out of the Earth powdered and infused in a close Vessel

Vessel of boiling Water, and let stand till it becomes clear, tho' it smell not, yet turns a Solution of Silver of a brownish Colour; but burn this Stone, mix it with a little Roll Brimstone, pour boiling Water on them, and the Nose is instantly struck with a very disagreeable Smell, but set this Mixture upon a Chaffing-dish of Coals in the middle of a Room to boil, and you have presently an insupportable Stink; pour off this Water, let it stand till it's clear, and it turns the Solution of Silver black as a Raven, thick and opaque, crudles and lets fall a jet black Sediment, which being dried and thrown upon live Coals, burns with much Stench, and a blue Flame. Hence we see, *First*, That the blacker this Limestone is, the more it abounds with Sulphur. *Secondly*, That Limestone opens the Body of the Sulphur, so that it communicates some of its Parts to Water. *Thirdly*, That the coarse white Limestone affords no warm Water, nor discovers Sulphur by blackening a Solution of Silver.

In the middle of this Limestone are round, oblong, square, or other shaped Pieces of Ironstone, several Fragments of Copper Ore, Lead Ore, Brasil; and nearer the River is Shale, with some small Seams of Coal no thicker than a Crown Piece: This fresh Shale powdered, warm Water poured on it, and let stand in a close Bottle till it cool and clear, then the Water poured on Tincture or Powder of Galls, becomes Purple in three Hours; and this is common to all the Shale I have met with and tried. Every Judge of Fossils must own that this is more different from Slate than the Pyrites; for as Galls strike an Infusion of Shale in warm Water, of a Purple colour, Slate will not, except there happen to be a Mixture of Ironstone or Ocre in it. Slate by being exposed to the Air, becomes hard, more serviceable and durable; Shale on the contrary moulders into exceeding thin Flakes like Leaves of fine Paper, and then decays to a black Powder. All Shale by rubbing between the Fingers, Powders, but not Slate. Shale wastes the Lead Ore near it by its strong Acid. Where there are great Quantities of Shale and Brasil, the Waters are so extreamly cold, that Miners, who work long therein, are in danger of losing their Limbs. Brasil abounds in the Coal-Pits, Lead-Mines, Ironstone-Beds, and Limestone near the River; It is of several Colours, like *Spanish* Brown, fine Gold, burnish'd Silver, Lead, Tin, &c. but all discoverable from their prodigious Weight; hence its Weight and Colour have imposed upon many ignorant People, and put them to Labour and Expence in expectation of *Peruvian* Gold nearer Home. If *Aqua Fortis* be poured on some powdered Brasil, a very small
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Fermentation follows with a Solution of a little Metal; a Piece of Brasil put in the Fire, stinks intolerably. Hence we have these Observations.

* From several Papers communicated to me by a Gentleman, I find that in the Years 1721 and 1722, there was a Design on Foot, and a close Correspondence between the Reverend Mr. *Richard Peat* of *Wirksworth* in *Derbyshire*, and a Brother-in-law of his, Mr. *Thomas Chapman*, to make great Matters of this Brasil or sulphureous Substance. The last projected the Scheme, and the first desired that he would bring somewhat to Perfection before he put him to the expence of unnecessary Post Letters. They divided the Undertaking into six Shares, Mr. *Chapman* had one, and two more by Mr. *Peat's* Order he sold to Esq; *James* at 200 l. who had often tried the Oar, and found what it contained, as he imagined.

July 15, 1721.

Dear Brother,

"According to your Direction, I have exerted my self to answer the Trust reposed in me, you having given me one sixth Part, and committed two Sixths more to my Disposal for the Use of the whole Undertakers: I have therefore set the two Sixths which are amongst us all, at the Price of 200 l. to Esq; *James*, who has tried the Ore here, and will send off a special Messenger on Monday with my Letter to you, to see the Situation and Depth of the Mine; treat him with the utmost Civility, because his Master is a Favourite at Court, and an Artist in the Business, but bate nothing of the Price I have set it at, because it will take: I understand by him, as well as my own Tryals at *Derby*, that there is a vast Quantity of Quicksilver in the Ore, besides *Sol* and *Luna*, therefore I thought fit to drop a previous Advice, for what I write by the Messenger will be expos'd to publick View.

Yours.

July 28.

"The Bearer is employed by Mr. *James* and Partners to view the Situation and Depth, and to try the Ore there; he is to have the Liberty of employing what Number of Hands he thinks fit, to sink or drive any where upon the Premises, at their own proper Cost and Charge, but they are not to have any Share of the Profits, till the Purchase Money be paid, but upon the receipt of the said Money, we are obliged to entitle them to the said Shares."

Dear Brother,

"The Person that I informed you I was treating with about the Purchase of the Ore in gross, has tried it several times in my Presence, but our Pots all failed in the Fire, but after all our Tryals we are confirm'd in this Opinion, That suppose our Pots should hold, they would not draw above the tenth part of what is really in it. I am satisfied from what I have seen and done myself, that the powdered washed and dried Ore, contains above 2 s. and 6 d. in the Pound. I should have had forty or fifty Shillings worth of Quicksilver Yesterday, out of fifteen Pound of prepared Ore, had my Pot held, but it breaking, I lost both. We shall try it next with *Aqua Fortis*, and *Aqua Regia*, so our Profits will be ten times greater, and easier come at."

Feb. 6. 1721-2.

"I am surprized to find, that tho' you had entrusted me with a Power to act and dispose of your Shares, which you had neither revoked nor withdrawn, yet you are seduced by the pernicious Counsels of a wicked Impostor and Deceiver, an Agent sent up by you, and invested with absolute Powers under your own Hand and given him one Share, which I would have sold at a great many hundred Pounds
" to

tions, First, That these warm Springs rise from a confused Heap of Limestone, Sulphur, Ironstone, Coal, Copper, Lead, &c. Secondly, That Shale is a Medium between Stone and Coal. Thirdly, That Brafil is a concretion of Sulphur, Mercury, and Earth, but the Sulphur carries off the Mercury in the Fire, and leaves only a scantling of insipid Calx of Earth behind.

The

“ to a Merchant belonging to the Mine
 “ Adventurers, who being Lords and Knights
 “ are Men of Character, and would have
 “ been far better Chaps to you than this
 “ fortunate Blunderer, who has taken away
 “ your old Senses, and has been very fortunate
 “ in securing that which will make him
 “ great ; for I can prove to their Faces,
 “ that the worst Brafil will produce 12 l.
 “ 10 s. per Tun in Quicksilver, besides
 “ good Sterline, &c. I will engage that one
 “ Man will manage two Tun and a half
 “ per Day to Still out the Quicksilver, and
 “ when that is done, it is prepared for Melting
 “ for Sterline. The Mercury that comes
 “ out of this Fellows Day’s Work is worth
 “ thirty Pounds and a Crown. The Method
 “ to procure it is this : You must get made
 “ Earthen Pots, or Still Bottles, that will
 “ contain One Hundred Pounds per Bottle,
 “ they must be like other Bottles, but
 “ a strong short Neck, the Mouth about
 “ three Inches Diameter, every one where-
 “ of must have an Iron Pipe about twenty
 “ seven Inches long, which let be fixt into
 “ the Bottle at one End, and luted with
 “ strong Clay tempered with Horse-dung
 “ and powder’d Glass to prevent the escape
 “ of the Quicksilver between the Mouth
 “ of the Bottle and Pipe, and must be
 “ turn’d down four or five Inches at
 “ the other End, that it may be two or
 “ three Inches immersed in Water all
 “ the while the Work is doing ; these
 “ Bottles must be filled only half full,
 “ because of the great Quantity of Sulphur
 “ in the Ore, and let ten of these be
 “ put at a time into the Fire. The
 “ Furnace must be built oblong, about
 “ twelve courses high, and so long, that
 “ five of these Bottles may stand
 “ lengthways, with room for the Charcoal

“ to fall round each Bottle, and so broad
 “ as to hold another Row with convenient
 “ room for the Fire to fall between.
 “ But your Still Bottles are only to rest upon
 “ a Brick end four or five Inches from the
 “ Bottom. As to the Sizes and Courses
 “ of Bricks, that must be according to the
 “ Size of your Bottles, with a Convenience
 “ left in the Wall for the Still Pipe
 “ to lie straight for its better emerging ;
 “ after Distillation, the Ore must be fluxed
 “ with Salt-petre, Argil, Borax, and Glass-
 “ Bottle ; this will make it flow so thin,
 “ that the Metal will fall to the Bottom ;
 “ pour it into a taper Vessel or Hole in the
 “ Sand when cold. The Slag and Metalline
 “ Part will fall asunder. After the first
 “ Melting, your Slag is the best Flux that
 “ can be. Pound the Metalline Part, and
 “ wash it carefully in a Bowl ; and all but
 “ what you see to be Silver at this first running,
 “ between that and the washed, is
 “ all to be refined. But tho’ this Flux
 “ enough, yet to try the Ore with it as it
 “ is, without its being deliver’d of its
 “ Sulphur, would either be all together in
 “ vain, or at least very trifling. By this
 “ Method a small Quantity of Fuel will
 “ do ; this is all the Advice needful at present,
 “ only light your Fire at the top,
 “ that it may heat leisurely. Let the top
 “ of your Bottle be fully covered. When
 “ the immersed Pipe has done smoaking,
 “ its work is over. Pound and sift all
 “ your Ore, and then one Bottle will serve
 “ a great many times. Between one Brick
 “ and another, must be half an Inch un-
 “ pointed for the Air, and the Brick end
 “ in the second Course, must meet in the
 “ middle of the first Course. This right
 “ understood and used, the Profit of two
 “ Days Work will put you in Stock for

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“ pur-

The black and indeed most of the Lime-Stone in the *Peak* abounds with Shells of Cockles, Oysters, and Escalops, the last whereof I found was always univalve; but of any Place in *Derbyshire* there is the greatest Plenty of these Shells at *Buxton* and *Stony Middleton*; but the following Considerations satisfy me, that they are Supernatural and never were cast in animal Moulds. *First*, here are Univalves as well as Bivalves. *Secondly*, there's plenty of imperfect as well as perfect Shells, some forming, others formed and hard. *Thirdly*, several of them have their Lineations in a quite contrary Course to those of Shelfish of the same Kind represented to us by those Figures. *Fourthly*, some of those which are always smooth in Shelfish, are here of the *Peclinites* Kind; on the contrary some of the *Peclinites* Kind have neither Curves nor Lineations here, but are quite smooth. *Fifthly*, some of them are loose in the Earth, and monstrously exceed the Life. Go on but a Mile from *Buxton* to *Pools Hole*, and there we meet with other animal Figures, viz. a fair Representation of a human Corps laid out, another of a Lyon couchant; and also some beautiful Tracts of domestic Utensils, as the fore Part of an old fashioned Chair, a set of Organs, and some vegetables upon the Walls of the Cavern, as fine expanded Fern Branches, &c. Now if any one is so credulous as to believe that the first was once a living human Body, the other a real Lyon, the last a Chair, Organs, vegetating Fern, &c. then I am content he should also think that the other might once have been living Shelfish. One Shell I found at the Hall, altogether unlike any of the living Kind, it was a Univalve, above a quarter of a Yard long, the Colour of Iron rust, very smooth, and near its juncture, were like two great Waggon Nails, on the one Side, and one in the Middle between them on the opposite Side, about two thirds driven in, and about a quarter of an Inch Distance between the Inside of the Nail-head and the Shell, a little of it broke off and was exactly like rusty Iron. Another of the Escalop Kind I found, exceeding large and smooth, but these laid loose in the

“ purchaseing whatever will be necessary
 “ for a full Prosecution. I have given a-
 “ way an eighth Part here between the
 “ Refiner and the Founder that operated.
 “ But the Quicksilver must be first taken
 “ and the Sulphur destroyed, before you
 “ can melt to any Profit for the Sterline.
 “ If ever our conjuring Impostor procure
 “ an Ounce of perfect Metal of any Kind
 “ by his Way of working, I durst be
 “ bound to give a hundred Pounds for it.”

“ Feb. 13. I am satisfied the Mine will af-
 “ ford us more than fifteen thousand Pounds
 “ per Annum, all charges payed, at the Rate
 “ of fifteen Tunn per Week containing three
 “ Pence per Pound Sterline, and three half
 “ Pence per Pound Quicksilver, so that I
 “ cannot say, whether it be prudent to sell
 “ at any Price.

Thus we see what great Work, large
 Expectations of vast and sudden Riches,
 yet all proved but a short lived Bubble.

Earth.

Earth. Some Pieces of the black Stone are so full of Shells, that in a square Inch you may see twenty distinct ones, of different Magnitudes, but all of the same Kind. The Method to get them whole out of the Stone, is, when you see a perfect beautiful Shell in the Stone, first heat the Stone an Hour or two in the Fire, take it out, and carefully chip off the Stone about the Shell, till you separate them. Some of them are one Shell, some an endless Heap of Shells, or very thin Scales thereof, which chopped off round about, you have still an intire Shell of the same Kind, and so on till you come to its Centre.

A little South of *Pools Hole*, (which is reckoned one of the Wonders of the *Peak*^a) and a Mile South West of *Buxton*, is a Cart Way, where,
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^a Though so much has been Written about the Wonders of the *Peak*, it may not be amiss to give a fuller and juster Account of some of them than I have yet met with. A very little Mile West of *Buxton* is *Pools Hole*, probably so called from one *Pool* a fugitive or criminal Offender against the Law, who took Shelter here; the Rock over the Front of its Entry is seven Yards perpendicular, the Breadth of the outer Entry at the Ground is nine Yards, the Door into it is two Yards and a half wide in the Rock, here the Height is from three to five Foot, therefore must we enter stooping for eighteen Yards, before we can stand up. Then we are admitted into a large Cavern twenty Yards high and ten broad, till at last its Height rises from twenty to forty five Yards, and from twenty to fifty wide; when you are come twenty eight Yards from the outer Entry, you come to *Pools Shelf*, which is a great long broad Flagstone, lying over Head the whole Breadth of the Entry: Just on the right Hand, about five Yards above the Level, is *Pools Chamber* and dining Room, which shelve into the Rock a pretty Depth; from this Shelf you enter another small subterranean Passage, on the left Hand, which opens into the other at the *Queen of Scots Pillars*, but here is nothing remarkable. Therefore return we to the first, when you are gone sixty Yards in, you rise up a steep Ascent, and leave a Hollow on one side, climb up eleven Yards and a

quarter to the Flitch of Bacon, of which whoever can see any Resemblance, have a stronger Fancy than I. Fifty eight Yards beyond this is the Font, which is four Foot high, and ten Foot in Circumference at bottom, with a small Bason of Water on its top, which drops from the Roof, and has bred this large Pedestal: Just by these on the same Side are four very large stalactitious Concretions called Haycocks, and are very like them. Six Yards beyond the Flitch is the *Queen of Scots Chair*, whose fore and lower Part is exactly the Form of an old Chair. From the Font to this Chair are most magnificent, high, perpendicular Walls of beautiful carved Work, exceeding the stateliness of the greatest Monarchs Palace, adorned with Variety of Figures as well of Vegetables as others. Nine Yards beyond the Chair, is the *Lyon couchant* lying upon his Belly on a Stone, with his Head up: Just by it is the Effigies of an old Man dead and laid out of a dun blackish Colour; two Yards and a half further is the *Queen of Scots Pillar*, and all upon the opposite Wall is very noble carved Work of the Stalactites. Thirty four Yards further is *St. Andrews Needle*, which is a small Passage of three Yards long under a great Stone; you ascend sixty Yards and a half beyond this up a most frightful Precipice of Rocks, in climbing which, be sure your Claws be in good Order, for you must be vastly indebted to them if you return safe, this Ascent being forty Yards above the
H 2 Level

in a bright Sunshine, immediately after a sharp Rain, the poor People gather small Crystals consisting of two Hexagonal Pyramids, and an intermediate Hexagonal Column, they are all of the same Figure, tho' of very different Magnitudes, and if any appear otherwise, they are either broken or imperfect; they naturally have all a most beautiful Polish, are of

Level and all a rough Rock, reaching very near the Day. When you are here, your Candles seem twinkling Stars to the Company below, as theirs do to you. Here you are at the far end of the Cave: At the Foot of this Precipice rises up the Water, which glides gently along the Side of the Hole to a Swallow which drinks it in except in a very great Flood. The Organs are between the Queen of Scots Pillar and the Lyon. The whole Length of this Cave is two hundred and thirty Yards.

Five Miles from this, just by *Castleton*, is *Peaks Hole*, or the *Devils Arse in the Peak*; it lies on the South West, or South side of *Castleton*. About sixscore Yards before you come to the Entry into this dismal Cavern, on the left Hand, is the Russet Well, which rises up with such an impetuous Force, that it throws back great heavy broad Stones, or pieces of Wood thrown into it; it throws out a Quantity of Water sufficient for three or four overshot Mills; its Depth I could not take, being filled up with great Stones. It is about a Yard over, and rises from below the Castle Yard, and whether this might not be the Spring that supplied the Castle above it with Water, or whether the third River in the Cave does not discharge it self this Way, or whether both, is uncertain. However it forms a large Brook or small River which runs thro' the Town and has a Stone Bridge over it.

Over the Entry into this Cave both before and on each Hand, is certainly the most august and awful Front in the Universe, being fifty two Yards and a half of a Perpendicular Rock on the right Hand; and seventy five Yards and a quarter high on the left Hand; and directly front from the Castle Wall to the Ground, is eighty nine Yards and a half; the Precipice which

slopes down all the Way on the left Hand from the Castle is above two hundred Yards long, that on the right is above one hundred. The Breadth of the outer Entry is above forty Yards, and about thirty high, and all a sloping Bank from the Bottom on the left Hand to the Side of the Rock on the Right, where is the Foot Way into it. From the Fall of the Drop at the entry to the fairest of the four poor Cottages within the Cave's Mouth is thirty five Yards three Quarters: These Cottages were formerly ten, but now reduced to four, only covered over with Straw and Rushes, no Walls nor Chimneys, but a few Stones cobbled up about three Foot high. The Rock serves them instead of a Roof; their Cover is a poor Shift to break the cold Blasts: A little from the fairest of the Cottages to the Top of the Steps or top of a gentle Descent on a sand Bank thirty nine Yards and a half; the breadth of the Cave here is twenty eight Yards and a half; a little on this Side is the Flitch of Bacon, tho' as like it as a Horse is like a Church. Opposite to the Flitch of Bacon on the left Hand, is the Entry into another small Cave called the Swine Hole, which is twenty eight Yards and a half long, two wide and two high. This has the smoothest driest Roof of all, being directly under the Castle. When you are got in twenty eight Yards you come to the four Cave Ends, where you have one Cave goes straight forward, but so filled with Stones brought thither by great Floods of the Rivers in the Hole, that I could not get into it; on the left Hand is another Cave, no End whereof I could see; on the right Hand is a third, with a very good Roof and Floor of the same Rock. Here I ventured to creep in twenty Yards on Knees and Elbows, and might have gone further had

of fundry Colours, as crystalline (which are the best) red, purple, brown, &c. The first are very fine, cut Glafs two or three Times, and are therefore called Diamonds; Naturalists suppose them to proceed from nitrous Steams, for they are continually of the Shape of crystalized Salts of Nitre; some are small as wheat Corns, others large as a Child's Finger.

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had I taken to the Belly, for it reaches the first River, and in that twenty Yards there went off other two small Caves on the left Hand, but I could not trace them. From the top of the Steps to the Bottom, is twenty nine Yards and a half; from this to the River side along a sand Bank, is forty six Yards and a half; here it is twenty Yards broad and ten Yards high; but both Heighth and Breadth contract the River, the first not being above half a Yard above Water, the last only eight Yards. This first River at the Side of the Rock on the left Hand, is only fourteen Inches deep; on the right Hand it is two Yards and a half deep; the Rock slopes down within fifteen Inches of the Water, and in a Flood it dips in the River. This River is sixteen Yards and a half over, the Rock at the far side is about four Inches higher; but go three Yards beyond and it is two Yards and a half high and nine Yards broad. From the far Side of this River, you either ascend a very rough steep Way on the right Hand to the Chancel, or go straight forward on a Level to the second River, which is forty Yards, at Midway whereof the Cave is forty Yards wide. The second River is three Yards wide, seventeen over, four Foot deep; the Entry into it is two Yards and a half high: Or ascend you on the right Hand from the first River, it's thirty five Yards and a half long, the Entry into it is six Yards wide: From this Entry to the Level below at the second River, it is twenty Yards and a quarter high, the narrowest Place in the Chancel is two Yards and a quarter, and from three Yards to four Yards and a quarter high, a very smooth Roof with several Petrefactions, and turns on the top like an Arch. From the Chancel to the

Level at the other side of the second River is forty two Foot and a half, the far End of the second Water Roof is yet five Foot higher. Beyond the second River is a large high stately opening, where are the Petrefactions spangling on the Roof and Sides of the Arch, which is twenty Yards high. Then you come to the sandy Hills and Devils Cellar which are sixty Yards long, at the far End of which is the swallow Mouth, which drinks in the Water that runs along the Cave Side. Then you come to the Arches which are seventy Yards long. Then arrive we at a Place so high, that no Roof is visible; thence to the Devils Church and Steeple, so go on to *Tom a Lincoln*, and the Figures of other fine Bells all in Arch Work; thence proceed we to the third River, upon which the Rock dipping down there is no further Passage. The whole length of this Cave is four hundred eighty Yards.

The Castle which gives the Name to the Town, is situate on the Top of the rising Ground, on the South Side of the Town. It is about a hundred Yards higher than the Village, and has either been a Watch Tower, Armory, or Fort, having no Chimneys nor other necessary Conveniences of Habitation: The Wall still remains at its first Height, having besides the Roof two other Floors, each about sixteen Foot high. Its length on the inside from East to West is eight Yards; on the outside twelve Yards and a half, from North to South eleven Yards and a half on the Outside, and seven on the inside, with a very narrow stone Stair within one Corner of the Wall. It has only one small Room on a Floor, with two small narrow Lights, on each fortified and inaccessible Side. It is all built of the hardest Free-Stone, which must have been a Herculean

A little below *Pools Hole*, rise up two Springs, said by *Cambden* and the Authors of the *Magna Britannia*, to be one cold and the other warm, but the Thermometer set in the Brook (which is six Yards North of those Springs) the Spirits fell one sixth below the third Inch, the cold Spring brought them down to the second Inch, and that said to be the

culean Labour, first to bring them, and then get them up to this Place, there being no such Stone in that Country; its inside has never been plaistered, but only faced with smooth Stones, cut a Yard above and below the Lights on each Side, full of antique Figures which I could make nothing of. On the North Side is the Castle Yard, in Length from East to West between two and three hundred Yards, and from North to South about one hundred and fifty. The Castle and Yard are so fortified on the East by the Castle Cave, over which *Cotton* tells us that *Tom Wilson* and his Master's Mare tumbled: This Cave is a small Streight, shut up on both Sides by great Precipices of Limestone Rocks, it is open above, and about two hundred Yards broad at the narrowest Place; at bottom is a most charming green Walk, from fifteen to fifty Yards wide, and half a Mile long; from the Top of the Torr before the Castle Gate, is about sixty Yards high; on the West Side it is fortified by that shocking Torr over the Entry into *Peaks Hole*. On the North Side has formerly been another inaccessible Rock, but is now covered with Earth, and the Ruines of the Castle Yard Wall. On the South Side was the Entry into the Castle by a Draw-Bridge over a deep Gulf cut out of the Rock, accessible only by a small Isthmus from the Mountain above. This Place before the Invention and use of Gunpowder, has certainly been the most impregnable Fort Man could wish or Wit contrive.

Mamtorr stands upon the right Hand from *Castleton* to *Buxton* about a Mile: On the Top of this high Mountain are the remains of an ancient *Roman* Camp with a double Trench; the fore or east Part of this Precipice is a frightful Torr; on its west or back Part is *Adyn-Torr*, the continual moul-

dering of which has carried off a large Piece of the Trenches on that Side, as perhaps they never met on the fore-side. The Camp seems to have been pretty near a Pentagon Figure, whereof remains to this Day one thousand one hundred and seventy Yards, besides what is decayed and fallen down; so that supposing it to have been whole, it has not been less than one thousand six hundred and fifty Yards in Circumference. The inner Trench is about fifteen Yards below the Summit of the Hill, on the very top whereof are two fine Mounts about three Yards higher. It is so contrived that it is impossible for so much as one Man to rise the Hill undiscovered, and far less any flying Scouts or straggling Plunderers to come from any Part to surprize the Entrenchment undetected. This Mountain overtops the whole Country, commands a Prospect over the whole *Peak* Country, and into *Staffordshire*, some Parts of *Yorkshire*, *Cheshire* and *Lancashire*. Its Top is covered with Corn-Mould two Yards deep, then Clay three fourths of a Yard; after that a Bed of Shale and a Row of Iron Stone, in their turns, for about twenty Yards lower; but the Iron-Stone Bed is still the thickest, being often a Yard, and the other not half so much; then begins an intermixture of Shale, and a mixt Stone between Iron-Stone and Greet-Stone in Beds of the same Thickness, which continues so to the Foot of the Torr. We are to observe in this Precipice, that these *Strata* lie all Horizontal from North to South, its different *Strata* lying in such exact Order as tho' it were the Wall of some pompous Edifice: In the upper Part it is perpendicular, but in the middle it shelves or slopes, so as three strong conceited Youths in sundry Ages, have attempted and with imminent Danger climbed it. Its Height

the warm Spring, which is ten Yards distant from the cold, raised the Spirits three Eighths above the second Inch; so that without a Thermometer it is impossible to discover any Difference between those two, and both are colder than the Brook in *March*.

In

Height from the Top to the Foot of the bare Rocks, is about one hundred and ninety six Yards, and from this to *Castleton*, we may guess at two hundred Yards more; on the Top of all it is about sixty Yards broad, at the Bottom of the running Shale it is about four hundred Yards broad; it is daily mouldering down by the Wind, for Shale exposed to the Air for a few Days crumbles into very thin broad Pieces, so as the Wind has carried up and covered the Top of the Mountain with it. It is as different from Slate, as Sparr and Diamonds, for it corrodes and destroys all Minerals near it except Iron or Coal, of whose Vitriol it partakes, and has no Solidity to be wrought upon. The above Trench runs from the North side of *Mamtorr* along the South Side of the Hill, North of *Castleton*; then it turns South, crosses the Valley, falls in below the Town, takes it and the Castle in, then turns West, so goes up to *Mamtorr*, its whole Circumference being about seven Miles. Hence it is plain that *Cambden* and his Copiers the Authors of the *Magna Britannia*, who make themselves merry with this Castle, have never seen it; here being a peice of the greatest Curiosity and Antiquity of any in the County.

A Mile South of *Mamtorr*, and four Miles East of *Buxton*, is that terrible perpendicular Gulf or Chasm, *Eldine Hole*, which I tried to plumb at seven different Stations, at six whereof I could only reach one hundred and ninety two Yards, from the seventh I plumbed it several Times and could only get two hundred and ninety five Yards down, about forty whereof seemed to be in Water. The Figure of this Place is exactly that of the *Fossa Magna*, being forty Yards long above ground, and ten over at its broadest; forty Yards from the Day begins the Mouth of the Chasm, not above four Yards long and one and a half broad: About eight

Yards below this Grip on the left hand opens a most dismal and frightful Cave, where one no sooner enters than he seems lost in a spacious boundless subterraneous Abyfs of both Space and Horror which I want Words to express, and no doubt these again communicate with others: Some have imagined that the surest Way of fathoming this Emblem of Hell, is by the Sound of any Weighty Body thrown into it. Three Stones therefore being let fall perpendicularly into *Eldine Hole*, the reaching of the Sound from the delivery to the Ear, was 9". 11". 10". Dr. *Halley* says, that heavy Bodies near the Earth fall $16f.\frac{1}{2}$ in one second. The Measure of Sound in one Second is 1142 Feet. To find the Depth of the Hole put $a=1273f.$ $b=8''\frac{8}{10}$ $d=1''\frac{2}{10}$ $s=10''$ $x=1266, 36$. Sir *Isaac Newton's* Theorem

$$x = \frac{adt + ab^2}{d^2} - \frac{ab}{2d^2} \sqrt{b^2 + 4dt}$$

$$1. \quad adt = 1273 \times 1.2 + 10 = 15276.$$

$$2. \quad \frac{ab^2}{2} = 636.5 \times 77.44 = 49290.56.$$

$$3. \quad d^2 = 1.44. \quad 4. \quad adt + \frac{ab^2}{2} = \frac{64566.56}{1.44}$$

$$= 44831. \quad 5. \quad ab = 11202.4. \quad 6. \quad 2d^2 = 288$$

$$= 3889.7. \quad 7. \quad b^2 = 77.44. \quad 8. \quad 4dt = 48.$$

$$9. \quad \sqrt{b^2 + 4dt} = \sqrt{125.44} = 11.2.$$

$$10. \quad \frac{ab}{2d^2} \sqrt{b^2 + 4dt} = 43564.64.$$

$$11. \quad \frac{adt + ab^2}{d^2} - \frac{ab}{2d^2} \sqrt{b^2 + 4dt} = 44831 - 43564.64 = x.$$

$$12. \quad x = 1266.36. \quad \text{and} \quad 1266.36 - 1265.82 = \frac{54}{100}.$$

Hence from a compound Equation of the descending Body and ascending Sound, we trace it little more than 1266 Feet, or 422 Yards deep.

It

In the Coal Pits, a Mile and a half South West of *Buxton*, the *Strata* of Earth lie thus, first Peat Moss, then blue Clay, then Shale full of Marcasites of Iron, and Iron-Stone, then sundry Beds of Iron-Stone, last of all a Seam of Coal five Foot thick, mixt with much Sulphur and Brasil, several Lumps of Ocre and Rubric; this Seam of Coal dips a Yard in three; its upper Part is very soft and flaky, fit only for burning of Limestone; its lowest Part is harder, tho' still a very indif-

It is not likely that all these Caverns in this Country owe their original to the Springs which have their Current through them, by the Waters forcing its Way through the horizontal Fissures of the *Strata*, and carrying the loose Earth away with it, and the loose Stones falling down. For 1. *Eldine Hole* which is a perpendicular, and the lateral Caves going from it which are dry, are against this Sentiment. 2. *Bamforth Hole* under *Charles's-Torr* (of which afterwards) is all horizontal, yet dry, except some drops of Water from its Roof in some Places. Nor could any Current of Water ever possibly come at it, lying high up in an Isthmus betwixt two low Vales watered with Brooks. 3. If they were owing to the Springs which have their Current through them, they must have been made some time, and by Degrees, not all washed down at once; but we find no Vestiges of Tradition that ever they were less, or the Levels higher and Roof lower than they are, and yet we see *Peaks Hole* is far from a Level, there is Room and Earth enough for the Water still to work upon. The Limestone Mountains of the *Peak* are full of those Caves, like Coney-Burrows, tho' not known nor visible, which is evident from those many Shakes of the Earth, so called by the Inhabitants, which are Depressions where the Earth is sunk down directly some Feet or Yards deep, as tho' it were from an Earthquake. The Cause of these Shakes I had an Opportunity to know, and it is this: When the subterraneous Passage, which carries off the circulating Water from those invisible Caverns is plugged up, so that its vent is irrecoverably stoppt, Water being an incompressible Bo-

dy, its Weight and Pressure on every Side, especially when the Weight of several Columns of Water of different Lengths are added to it and the Cave full, the prodigious pressure must and will force some vent, but the Water having lifted up the Earth above it, when once the first has got vent, the last subsides; but if this pent up Flood happens to make its Way through the Surface of the Earth in an inhabited Place, dismal are its Effects, as was fatally felt by most of the Inhabitants of *Kettlewell* and *Scarburton* in the Year 1686, when the Side of a great Limestone Hill over the Town burst, and with incredible Force threw out such prodigious Quantities of Water as demolished several Houses, carried off the very Walls and Stones, drowned most of the Inhabitants, and filled the Meadows with Stone and Gravel. Another such frightful Accident happened near *Dent* in the same West riding of *Yorkshire*, about fifteen Years ago in the midst of a very dry summer Season, but the Water bursting the Mountain in a waste Place the Flood did no Mischief, tho' it rose up the Height of an ordinary Church Steeple: it is also remarkable that these Shakes and Caverns are in the driest hardest Places, as I have observed in several of them in *Derbyshire*. There being nothing remarkable in the ebbing and flowing Well, besides its secret Supply with great Quantities of Water which it throws out in sudden Gluts at uncertain Times, even several Times in an Hour after great Rains, and not once a Week in dry Weather, I have therefore omitted it. It is hereby evident however, that it has no Communication with the Sea, nor its Flux and Reflux.

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ferent Coal, which melts on the Fire and cruzzles, sometimes a Vein of Lead an Inch thick crosses the Coal. It is more beautiful than other Ore, sparkles like fined Silver, but bring it to the smelting Furnace, and you have little besides Sulphur; the Acid of the Coal having consumed the Lead till it reach its kindly Soil the Lime-Stone and Greet-stone below the Coal. Fifty Yards from the Day, is a strong thick Bed of blue Clay, whose upper Part is a deep Ocre or reddish Colour, full of black Lumps like rusty Iron, which put into *Aqua fortis*, raise neither Heat nor Fermentation, but in a little while several small Bubbles rise, and the Liquor turns green, which is the Copper dissolved; all the Water in the Coal Pits is very cold, nor can Lime-Stone and Coal consist together.

The *Strata* of Earths in the Lead-Mines next to *Buxton*, are, first a thick set fine Turf a Foot and a half deep; then betwixt a Sand and a red Clay, or a reddish sandy Clay or a hard Soil, half a Yard thick; thirdly, brown Clay from half a Yard to two Yards thick; fourthly, fine white Sand half a Yard thick; fifthly, a very hard Rock of white Lime-stone two Fathoms thick; sixthly, a redder Sand from ten to twenty Fathoms, this is of a hard Substance and accompanies the Ore; seventhly, a black Lime-Stone from six to eight Yards thick: Then they come to the same Sand as before, if there is Ore; but if no Ore, there is a reddish yellow Bed of Clay, of the Nature of Marle. Pursue this through the Clay, and they come to a yellow Sand with Ore. These *Strata* lying in several Degrees of thickness, are from sixteen to eighty Fathoms deep; here is very much white Spar, but none of the green nor yellow; it breaks into Rhomboids. If this be without Lime-Stone, there is very little or no Ore: But if under the Lime-Stone Clay appears, the Vein is said to be out, and there remain no more hopes of Ore, except they soon find the Lime-Stone again below the Clay. Most of the Ore lies in Cauke-Stone three or four Foot thick. Here is very little Shale or Brasil; where a Chink happens between the Greet-Stone and Lime-Stone, it is filled up with Petrefactions between a yellow and a white Colour, and very hard, as Spar. The Workmen afraid of Damps, are always well provided with Drifts or Levels, that they may be supplied with fresh Air, which causing a free Ventilation, prevents both the Stagnation of the Air, and a Collection of Sulphur which might be fired with the Candles. The Lime-Stone in working smells strong of Sulphur, and their Blasts (which are Bores made in the Stones, filled with Powder and blown up) being so very strong of Sulphur, extinguishes the Smell of the Gunpowder. They have here Spar Ore and Cauke Ore, the last is much the richest. In digging for

Stone near the warm Waters, you find several surprizing Masses of mixt Minerals, as tho' they had been artfully melted together, as of Lime-Stone, Iron-Stone and Copper Ore, of Sulphur, Iron Ocre; of Lead-Ore, Iron Sulphur and Lime-Stone, &c.

The Ground all about the warm Springs, and on the south side of the River, is very dry fruitful and pleasant, being a thin warm fertile Mould, lying upon Limestone, the Grass tho' short is very sweet and fattening: Hence they have the most delicious Beef and Mutton, Snow lies a much shorter time here than in the lower Country. Here is good store of Hares and Foxes, several wild Rabbits of the Rocks, Partridges, Moor game of two Sorts, one a large black Cock weighing five Pounds a Piece, the other a brown and much less, tho' more plentiful; at seven Miles distance are many Pheasants. The small River which runs from West to East abounds with fine Trout, Grellin, Cray-Fish, and Silver Eels. And Mr. *Taylor* of the Hall, upon his own Expences, keeps a very good pack of Hounds, for Gentlemens Diversion, as also a pleasant warm Bowling Green planted about with large Sycamore Trees; and in the House a fine *English* and *French* Billiard Table. A little East of St. *Annes* Well, over the Ditch or Level which carries the warm Water from the Bath, is made a curious natural hot Bed, and upon the rest of this Canal might be made the finest Greenhouse in the Northern Kingdoms; he has also taken in several new Gardens with planting, and several curious Walks. The Garden Stuff has a peculiar, grateful Flavour; up one pair of Stairs in the Hall is a beautiful dining Room, seventeen Yards long, and nineteen Foot Wide, seven other entertaining Rooms, eleven lodging Rooms with single Beds and Closets, twenty nine other lodging Rooms; this one House affords sixty Beds for Gentlemen and Ladies, besides suitable Accommodations for their Servants and all other proper and useful Offices.

The Air here tho' thin and pure is not near so cold as one would imagine, for the Place lies low upon the Lime-Stone, compassed with Hills. Here are no Fens, Marshes, Stagnant Waters nor Pits to infect the Air or load it with their Steams. The Waters are very good being strained through the compact Rocks of solid black Lime-Stone, which yields much less Stone Powder to the intercurrent Waters than the white. It is a large open Country every Way convenient for Sportsmen.

The first Author that wrote on any of the Mineral Waters of *Britain*, was Dr. *William Turner*, Physician to the Duke of *Somerset*, who also was the first *English* Writer on Botany. He during his Exile in *Basil*, for his Religion in the Reign of *Queen Mary*, wrote a Treatise on Natural Baths in 1557, and begins with the Bath of Baths in *England*.
Then

Then fifteen Years after, Dr. *John Jones* a *Welshman*, who lived at *King's Mede* near *Derby*, wrote on *Buxton Waters* in 1572. ° He reckons up seven or eight warm Springs, several whereof rise up into the Bath. It was there he found a hot and cold Spring so near together, that he could put one Finger into one, and another Finger of the same Hand into the other, but except *St. Annes Well*, he has told us of none of the rest. *Cambden* will have them to be nine Springs, most whereof rise up in the Bath; he says, that since the Earl of *Shrewsbury* had lately provided and

° The Benefit of the ancient Bathes of *Buckstones*, which cureth most grievous Sicknes, never before published, compiled by *John Jones*, Physician, at the *Kings Mede* near *Derby*, *Anno Salutis* 1572, Jan. 18. London, imprinted by *Tho. East*, and *Henry Middleton*, for *William Jones*, 4to. p. 158. *Buckstones* is Ten Miles from *Chatworth*, Sixteen from *Chesterfield*, Sixteen from *Sheffield*, Twenty from *Derby*, Thirty from *Westchester*, Thirty from *Litchfield*, Thirty from *Stafford*, &c. We cannot tell whence *Buckstones* is derived, but being *Saxon*, it is probably from the wounded *Bucks* coming there to drink. *Cottrel* will have one *St. Anne* found in the Well, or the Waters set from *Flood Jordan*. Natural Baths be those which flow through the Entrails of the Earth, taking their Effect of such Things as they run through, and receive Power by, for many Infirmities most available. The chief of these Baths, which is the warmer Spring, void in Effect of all Corruption, arguing therefore no great quality of *Brimstone* (as in Baths) nor of *Alum*, as some have bruted, for then it should not only be of another Colour, marly Yellow, or swarthy Green, but also it might sensibly be perceived by Taste. Albeit I acknowledge that *Aristotle* affirmeth that there is no such hot Spring without a Mine of *Brimstone*; and I think with *Fallopius* and *Savanorola*, none without fiery Heat, altho' the Quantity may differ, for if the Quantity were equal and like to the Minerals in *Bath*, the Heat of as great Force, fortified with like *Antiperistasis*, and as near the Head, then it should little in that

respect vary from *Bath*; but *Buckstones* Bathes, have not the fourth Part of the Heat which the *Bath* of *Bathes* have, nor the other Minerals which be there, for *Buckstones* is much like, as if a Quart of boyling Water were commixed with a Gallon of cold Water; but *Bathe* is, as if to a Gallon of seething Water were put a Quart of cold Water, by reason whereof, it attracteth and dissolveth more speedily, but *Buckstone's* more sweetly, more delicately, more finely, more daintily, and more temperately, not bringing half so many grievous Accidents as *Bath* doth, but in process of time very effectually for many Infirmities, most commodiously restraining unnatural Issues, and strengthening the feeble Members, assisting the Animal, Natural, and vital Faculties, dispersing Opilacions and qualifying Grievs. The Well Springs are situate in a Valley, hard by a running Brook, and run into it, where at the meeting you may sensibly perceive and feel the hot Water on the one side of the River, and the cold on the other, notwithstanding so commixed after, that it letteth the River afresh in the coldest Weather, for the Space of a Quarter of a Mile; an Argument of the Power of the Heat of those Springs which be three especially, and those very excellent and beneficial for divers Distemperatures, Grievs and Sickneses; but there be five or six other, altho' not so good, but were the cold Springs prevented mixing with them, they would be more excellent, for that the more cold Infirmities might be cured by them, being made more hot, for undoubtedly as mine one Foot should step on the hot Spring, mine

and beautified the Place with Buildings, the Waters began to be resorted to again, for their extraordinary Effects, so that the Waters had lost nothing of either their Virtue or Reputation, but had not been so much frequented, because Convenience and Accommodations for the Reception and Entertainment of Company were wanting, till *George Earl of Shrewsbury* built that Edifice.

The

mine other would light on a colder, yea, the one Finger I might put in one, and another in the other, especially in those below; howbeit you may find in any some alteration; albeit not so much by a great deal. Joyning to the chief Spring, between the River and the Bath, is a very goodly House, four Square, four Stories high, so well compact with Houses of Office beneath, and above, and round about, with a great Chamber, and other goodly Lodgings to the Number of Thirty, that it is and will be a Beauty to behold, and very notable for the Right Honourable and Worshipful that shall need to repair thither, as also for others, yea, and the Poor shall have Lodging and Beds hard by for their Uses only. The Baths also so bravely beautified with Seats round about, and defended from the ambient Air, and Chimneys for Fire to air your Garments, in the Bath side, and other Necessaries most decent. And truly, I suppose, that if there were for the Sick a Sanctuary, during their abode there, for all Causes saving Sacrilege, Treason, Murther, Burglary, Rape, and Robbing, by the Highway-side, with also a Licence for the Sick to eat Flesh at all times, and a *Friday* Market Weekly, and two Fairs Yearly, it should be to the Posterities not only commodious, but also to the Prince great Honour and Gain. It is situated in a goodly Seat, and that in an excellent hungry Soil, passing Healthy, and in time would grow to be very Wealthy, and the Commons about would be reduced to great Fertility; for the Ground on the one Side is full of Limestone, bringing good Grain, on the other, a fine black Mould, and a gross. Howbeit the Place be somewhat Stormy in

Winter, yet nothing like *Kerby Kendal* in *Westmorland*, nor *Brecknock* in *South Wales*, nor to *Bodnane* in *Cornwall*, &c. all the which be notwithstanding goodly Towns, and Wealthy, and through Industry, made to the State very profitable, as in time, no doubt this would, passing them, as you may perceive, a thousand Parts, in a Commodity, unto the which, out of all Quarters of the World, not without just Cause, would repair very many, and the rather, a great deal being in this sort furnished to their Benefit with a Physician placed continually. By comparison, this be like the Pepper Bath beside the Head of the *Rhine*, saving that the Pepper Bath saith *Munsterus*, continueth so long as the springing Herbs and Grass doth remain in their flourishing Force and Virtue; but these so long as the Matter feeding them, do not fail; and surely the Sweetness and Pleasantness of the Water of the Bath, sheweth some excellent Ore, rather than either Brimstone, Alum, Bitumen, Iron, Copper, or any such like, for then it should in drinking be perceived by the Taste. Albeit true it is, as affirmeth *Galen*, all such hot Baths of such Minerals have force of drying, but in those you find no such sense, but so fair, so pleasant, and so delectable, that it would seem to be a dulce Bath made by Art, rather than by Nature, howbeit the Effects declare Brimstone to be herein. Seawater often strained through Sand, becomes sweet, and so may those Waters being strained through the Earth, lose their Mineral Taste, but retain great Virtue both manifest and hidden; for nothing better and more readily takes away Distemperature of Heat or cold active Qualities, or evacuateth

The warm Waters which I have observed there at present, are, first the Bath, which takes in several warm Springs. Thirty two Yards and a half North East of it is St. *Anne's* Well, which is chiefly supplied from a Spring on its North Side, rising out of a Rock of Black-Limestone, or bastard Marble, under a shelving Stone laid so on purpose. Twenty Yards South East of St. *Anne's*, in another Close, is a hot and

cuateth by the Pores, the superfluous Humours, than a dulce or pleasant Bath, or that also maintain the Health more, for when as it is by Nature moist and moderately hot, by Humidity it humecteth, drieth, sponge of Heat. By Heat it heateth Cold caused of congealing by moderate closeing, thorough drieth, strengtheneth the loosed, as by insensible Evacuation, it mundifieth all Parts, the which thing is well proved daily there. Therefore when the Actions or Uses of the Parts be depraved, diminished, or quite abolished, by any of the aforesaid Distemperatures, properly or accidentally, not mortally, nothing more safe, nothing more aptly, nothing more delicately reduceth them to their old and pristine Activity, than the dulce or delectable Baths or Wells of *Buckstones*. For the weak Members be as well strengthened by such Medicines as temperately heated above their natural Property, as eased of their Grief, by qualifying the Dyscrasy in any or all of the Parts. And this it doth as well, by reason it rarefieth the Parts, provoketh Expiration, and wipeth away Filth, as that it firmeth joyneth, and consolidateth the loose, weak and severed Substance of the simple or compound Parts; measurably qualifying the overheated Members, and drying such as be over moist. Therefore good for all such Diseases as come of overmuch contrary Heat, and for such as come of overmuch cold Moisture; for cholerick and salt Humour parched and compacted together, by which we may gather that it is good for such Rheums, Fevers, Headachs, weak Sinews, old Scabs, Ulcers, Cramps, Numbness, Itchings, Shrinkings, Ringworms, Aposthems, Sterility from overmuch Moi-

sture, much and watery Fluor albus; *Item*, Weak Men that be unfruitful, and for them that have Priapismus, and that be parboyled in *Venus Gulf*; for Consumptions of the Lungs, for such as vomit Blood, Inflammations of the Liver, too much Heat and Stoppage of the Reins, burning of Urine, Strangury, and continual desire to make Water, Tenesmus, involuntary flowing of the Semen, Hemorrhoides, Piles, overflowing of the Menfes, Hiccup, Vomiting, Obstructions of the Liver and Spleen, Asthma, Fluxes of the Milt and Liver, Green-sickness, Morpew, and the Stone; the healthy People in good State long it preserves. Best Drink for the crazed at *Buckstone*, is middle Ale, neither too new nor too stale, not over hopped. Your Flesh meat shall be most ordinarily, as follows; Mutton, Veal, Kid, Rabbit, Turkey, Capon and Hen, Chicken, Pheasant, Partridge, Curlew, Cnotwype, Woodcock, Snipe, or any other cloven footed Fowls, poached Eggs, or reer roasted. These Fruits may be used, Almonds, Raisons, Figgs, Pomgranates, Quinces, Wardens, and Chesnuts roasted, Rice, Marmalade, green Ginger, or their comfortatives Conserves, or cordial Confections; or to them that have cold Diseases, or be of a cold Constitution, Wines of these kinds may be permitted, as a Cup of Sack and Sugar, if the Disease forbid it not, or of good Gascoigne Wine to them that be lean with Sugar; or white Mamulries of *Madera*, a Myas of good Ale, a Caudle, or Alebury. Moreover the following Fish may be permitted, although Licence be obtained, Trought, Crevis, Bream, Barble, Theuion, Perche, Roche, Bret, Garnet, Whiting, Smelt, Cod, Myllers-Thumb,

Of the WARM WATERS.

and cold Spring, both rising up into the same Receptacle. About sixty three Yards, South and South-East of *St. Annes*, in the same Close with the hot and cold Spring, is *Bingham Well*, ordinarily called *Mr. Leigh's Water*, a worthy Gentleman seven Miles distant, who has made this Spring his Favourite for several Years, and reaped great Benefit by it. A little way East of this, on the East Side of a Stone Wall, is another small,

Thumb, Bully-Head, Loch, &c. Your Meal will be best about ten or eleven a Clock, if you can fast so long; if not, take some small Refection before you go into the Bath, or not long after you come out. If you go not to Bed, nor receive any Medicine, your Hour of Supper shall be about six a Clock; but I would have you use no Meat after that Time, nor yet Drink, if you can abstain. When you come first thither, because the Air is far colder and more sharp, than in any part of the South, see that you be always well clothed and have a good Fire, especially tender People, and such as have been brought up in the South Cities, and they whose Pores be open. Albeit the Air be very wholesome and pure, infected neither with Exhalations of standing Pools and Ditches, nor any pestilent and evil Air, as issueth forth of Ponds, Synckes, Sewers, and Draines, nor with such as comes off hempy Grounds, nor great Mears compassed on every Side with the Hills, nor with such as comes out of Houses fulsomely kept, Slaughter-houses, and Shambles, all which Airs be hurtful to all Ages, as contrarily that which is pure, as is at *Buckstones*, is to all most profitable; a larger Diet may be used here than at the Bath. We will somewhat entreate of Exercise, every Moving is not an Exercise, but that which is vehement, and that which in some is vehement, may in others be but an Exercise, therefore the End of this Vehement shall be alteration of Breath, seeing in whom there is no alteration of Breath, it is not to be called Exercise. Utility of Exercise is double, one to the Evacuations of the Exercise, the other to the Conservation of the State of the Body; for of vehement Moving, three things are

obtained, Hardness of the Parts through daily Exercise, encrease of natural Heat, and a swift moving of the Breath. By Hardness of the Breath they be less affected in Labour; by encrease of Heat, not only mighty Attraction is caused in the Body, but also a speedier Alteration, a better Nutrition, and a perfecter Distribution into all the Parts, by Benefit whereof the Parts be kept soft, and the moist be thinned, and the small ways of the Body be kept loose. And seeing Exercise helps Digestion, it ought not to be used when a multitude of raw Meat is contain'd in the Vessels, least it might bring great danger to the State of good Health, and farther encrease the Grievs of the Sick, by augmenting of Juice before it were altered perfectly; so that the Exercise is best which is before Meat, seeing the Bodies which be unpure and unpurged of common Excrements, the more you nourish them, the more you hurt them. The time for Exercise is best, when the last Days Meat is digested with a double Concoction, as well that which is in the Stomach, as that which is in the Vessels of Blood; for then the time of Meat again draweth nigh, and if you use Exercise sooner or later, you shall either fill the Body with raw Humours, or encrease pale Choler. Your Urine may be a good Note when you are to begin Exercise, for if it be like clear running Water, it shall shew the Juice yet to be raw, but if it be higher than Amber, or between it and Jacynte, yellowish or cholique Red, it shall shew the Juice to be digested long before. The Sick can bear but little Exercise whether Men or Women, but when the Weather is not seasonable, they may play in different Galleries at *Trall in Madam*.
The

small, slow, hot Spring, which mixes with a beautiful purling cold Spring that rises up close by it. Another plentiful warm Spring rises up in the Stream of the Level, that carries the Water from the Bath, this is thirty four Yards East of St. *Annes*. Four Yards farther East on the South Side of this Stream, rise two or three other warm Springs.

The

The stronger may use Bowles, Cranckes, or Shooting at Garden Butts, or Wind-ball, or Yarn-ball, or Plumbetes, or fine Hullyer, or Bowling, riding in a Coach, Waggon, Chariot, Horse-litter, or Chair, using any of them long, short, or mean, slow, swift, or mean. After long Travel rest two or three Days before ye Bathe, get acquainted with the Air, and have Melody, for it refreshes the Wit, encreases the Strength, and Melancholly it puts to flight; let your bathing times be Morning and Evening before Meat, but after your Exercise and Purging, when the Sun is a good height, misty Exhalations gone, the Weather fair, and in the Summer Season, between the beginning of *May*, and latter end of *September*, first saying the following Prayer on your Knees; but in pestilential Seasons, utterly avoid Bathing. You may tarry two or three Hours in the Bath if you please, if the Disease require it, and the Body can bear it. When you come out let your Body, especially your Head, be well rubbed and dried, your Cloaths well aired, and if you must go to Bed, put two Bladders of warm Water, one under each Arm-hole, another under the Twists, and there sweat as Strength will bear. This done, dry your Body again, and rub it well all over (howbeit not in every one) untill the Skin be red; but if such Friction be appointed, keep your Bed for two or three Hours after, lest the small Meatus being opened, a sudden Alteration may happen, of Nature altogether abhorred. No Medicines should be taken without good Advice of a Physician, having observed the above Rules, and tarried there fourteen, twenty, or forty Days; when you return home use the same Meat and Drink for a Month, and be sure you put down in the Register-

Book, kept by the Warden of the Bath, or the Physician that shall be appointed, your Name, Place of Abode, Day of your coming thither and departure, Condition, Calling, Disease, and Symptoms, and the Benefit you received, paying according to Custom, a Groat for the Recording. And besides this, I would have every Yeoman to pay 1 s. every Gentleman 3 s. every Esquire 3 s. and 4 d. every Knight 6 s. and 8 d. every Lord and Baron 10 s. every Viscount 13 s. and 4 d. every Earl 20 s. every Marquess 30 s. every Duke 3 l. 10 s. every Archbishop 5 l. every Bishop 40 s. every Judge 20 s. every Doctor and Ser-jant at Law 10 s. every Counsellor and outter Barister 6 s. and 8 d. every Minister 1 s. every Duchesse 40 s. every Marchioness 20 s. every Countess 13 s. and 4 d. every Barones 10 s. every Lady 6 s. and 8 d. every Gentlewoman 2 s. and all for the Treasury of the Bath, to the Use of the Poor, that only for help do come hither, the one half, the other to the Physician for his Residence. If any think this magisterial imposing on Peoples Pockets, let them consider their Abilities, and the sick Poores Necessities, and think whether they do not in idle Pastimes throw away in vain twice as much yearly; it may entail the Blessing of them that are ready to perish upon you, and will afford a pleasant After Reflection. God has given you Physick for nothing, let the Poor and Afflicted (it may be Members of *Christ*) have a little of your Money; it may be the better for your own Health; Heaven might have put you in their room, and you in theirs, then a Supply would have been acceptable to you.

The Prayer.

As thou hast, most merciful Father, of thine infinite Bounty and Grace, given us
Power

The Bath is a large stately Arch Room, ten Yards long, five Yards and a half wide, and much of the same height. There is a Stone Bench

Power to come to these thy Baths (preordinate of thy divine Providence) for the Benefit of us thy dear Creatures : so likewise rightly we confess, that the Breach of thy most Holy Laws, which we have too often done, is the very Cause that we be so vexed, grieved, diseased and enfeebled, as a just Cross for our Misdeeds, seeing that to the third and fourth Generation, thou hast said thou wilt them visit, howbeit we hope in thy Mercies, unto the which, as unto a safe Anchor (tossed in this miserable Maze of worldly Wickedness) we certainly trust, taking comfort of thy heavenly Word, that whom thou chastifest thou lovest, so love us good Lord, that we unfeignedly trusting in thy Word, the second Person in Trinity, our Redeemer, and calling upon thee in his Name (in one Unity) may be relieved, comforted and eased, as thou in thy Word hast promised, (if it be thy most gracious Will) of all our Grievs, whether they be inward or outward, in Body or Mind, by the Benefit whereof, all the Atheists, Godless, and Careless of the World, may know thy Power, that from thee cometh Health to all Nations, for from thee cometh all Knowledge how to use thy Creatures for our best Use. Grant therefore, good Lord, the healthful Spirit of Truth, the Holy Ghost, to help, aid, and assist us in all our Afflictions, and to guide thy Ministers, Nature's Interpreters, Physicians, with thy heavenly Health; that being strengthened by thy Influence, may not only the better Benefit us, and the certainer ascertain us of thy Gifts here and elsewhere, but also the better aid and assist us, seeing they be thine appointed Counsellors, as they whom we cannot be without, as thy living Word teacheth; so then strengthen those Baths, teach them, and assist us, good Lord, that what is profitable for our Benefit may be here had, they shew, we seek, find, and observe: what hurtful, they may declare and withstand. This grant, eternal Father, thro' the Blood of the immaculate Lamb *Jesus*

Christ, that we departing thence better in Health and Strength, thereby may glorify thee over all the World the more. *To whom, with the Son and the Holy Ghost, be all Glory, Praise, Dominion, and Power, for ever and ever. Amen.*

God preserve the Queen's most Royal Majesty, Nobility and Council, and namely *George*, the Mighty Earl of *Shrewsbury*, and the Noble Countess *Elizabeth* his Wife, whose good Furtherance in these Edifices hath not lacked; with the Right Honourable Lord *Talbot* his Son and Heir, and the Honourable Lady his Wife. Mr. *Guyllbart Talbot*, and his most Virtuous Wife, his whole Offspring, Family, and all the whole Land. *Amen, Amen.*

Thus I have given the Substance of this rare Treatise as far as relates to those Waters, wherein we may observe, 1. That he was no Stranger to Perspiration and Circulation, though we would have all the World to be ignorant of them before *Sanctorius* and *Harvey*. 2. That here is not one Word of drinking the Waters, only Bathing. 3. That there having been a Register of the Cures done by this Water, kept by the Bath Warden or Physician when present; and our Author having the Opportunity of perusing these Books in compiling this Work, it must certainly be of Use to us to see the Effects of those Waters, by Bathing, in sundry Cases and Constitutions. 4. That twenty five Years after the Writing of this Book, these Waters were so much frequented, that in the thirty ninth Year of Queen *Elizabeth*, there was a Clause of an Act made, That none resorting to *Bath* or *Buckston* Wells should beg, but should have Relief from their Parishes, and a Pass under the Hands of two Justices of the Peace, fixing the time of their Return; nor were they to beg there upon incurring the Penalties of that Act; whereby we may suppose that Strollers, Vagabonds and Rogues, had used this Excuse before to cloak their Designs.

along

along one end and side of it, for the Bathers to dress and undress upon; between this and the Bath is a Walk of smooth Flagstones, and at the Corners of the Bath, at each end, are very good Stone Steps or Stairs to go down. The Bottom is paved with fine smooth broad Flags; on the Backside lies a Rock of solid black Limestone, or a kind of bastard Marble; the Sides are built with fine polished Freestone. The two chief Springs rise up through this Rock, but several lesser Springs rise up all over the Bath through Chinks in the Rock, and the Seams of the Pavement. These afford plenty of Water, and Strings of great Bubbles, containing a warm Air, and sulphureous Steam, which dilate themselves as they rise up, and the pressure of the Water diminishes. All over the Surface of the Bath, the Water is covered with a most beautiful Steam of rarefied Air and Sulphur, making their escape by a Motion just like small Flies or Midges rising out of the Water. Over the Bath hang two large Iron Chains for the Bathers to go in and hold by. At the South-east Corner is a Pump set down; at the North, or lower end, is a large square Hole in the Foundation of the House Wall, which gives vent to the Water out of this into the outer Bath. Above this Hole, just upon the Surface of the Water, are two small Holes in the Wall, whereby this Bath formerly discharged it self before the Year 1697, when Mr. *White* brought up a Level from the Brook to the Bottom of the Bath, (above a hundred Yards long) that it might be daily emptied, washed, and filled with fresh Water, which could never be done without a Level. He also made the outer Bath at the same time, where the old Kitchen stood, and called it *White's Bath*, at the lower end of which, he made a Sluice and Shutter to lift up and let down, to let the Water off; he fixed a Pump in the Bath to pump off the cold Springs whilst the Ladies were in the Bath, but afterwards made a Sough to carry off the cold Springs intirely, that they should not rise up in the Bath, nor chill its Water. The inner Bath is twenty six Foot six Inches long, twelve-Foot eight Inches and a half broad, and at the lower End four Foot nine Inches deep of Water, and four Foot three Inches at the Head, or South End; they can raise the Water near a Foot higher upon occasion; the outer Bath, tho' walled about, yet is open above; it is seventeen Foot long, ten Foot two Inches wide, and four Foot sixteen Inches deep of Water which comes from the inner Bath. The Sluices of both Baths being opened, and the Water run off, I examined their Dimensions and Springs; the Sluices being shut again, both were full in two Hours and eight Minutes, tho' at present one fourth of the Water gets off through other Crannies, made by its perpetual Pressure and Motion. It is also worth Notice,

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that

that tho' there is a perpetual Steam and Dew in the *Bath Room*, yet the Iron Links have not suffered by Rust.

St. Annes Well formerly rose up into a stone Basen, shut up within an ancient *Roman* Brickwall a Yard Square within, and a Yard high on three Sides, till Sir *Thomas Delve* built the present Arch over it, which is twelve Foot long and twelve Foot broad, set round with stone Seats on the Inside; it has a strong Iron Bar running Cross its East End or Entry instead of a Wall, to keep the Arch firm. In the middle of this Dome the Water Springs up into the middle of a Stone Basen, two Foot Square above, but three Foot wide below, on the Side next the Brook, from the shelving Stone laid over on the North Side above the main Spring; the lesser Spring rises up in the West End of this Basen, it bubbles up constantly all over. This Wall is twenty four Yards North of the outer Bath.

Bingham or Mr. *Leighs Well* is a very strong Spring, rising out of the black Limestone in a very dry Ground, sometimes it throws forth six times more Water than at other times. *Octob. 6, 1732.* Having been much Rain both on that and the preceding Day, this Spring threw forth a prodigious Quantity of Water, whose Warmth raised the Spirits in the Thermometer only four Inches and six eights in the Forenoon; but it fell yet half an Inch lower in the Afternoon. But *St. Annes Well* raised the Spirits five Inches above *Bingham Well*, but the small Spring beyond the last, lost very little of its Heat. So that *Bingham Well* is rather an uncertain than perennial Spring. But the above two Springs never alter by Vicissitudes of Weather or Seasons, nor yet that Spring which rises up in the Canal from the Bath, all which three boil up with an impetuous Force in large Balls or Bubbles of heated Air, which break on the Surface. I tried these Waters with the hydrostatical Balance, by immersing the Glass Bubble, whose Bulk was equal to the Bulk of fifteen Drams and a half of common Water, that is one eighth Part of fifteen Ounces and a half. I found several Variations, for certainly to try the Weight of Water is the most difficult and uncertain Experiment that attends a strict Examination of Waters; it is never a whole Day the same exactly, but differs according to the Expansion or Condensation of the Air in them, the Quantity of Water contained in the subterraneous Channels, the Rapidity or Slowness of its Motion, whereby it brings more or less foreign Matters along with it, its Stagnation &c. *September 15* being a very clear hot Day, with a small Breeze of Wind, till two a Clock of the Afternoon, then at three a Clock, Thunder, Lightning and a prodigious hot sultry Air. *St. Annes* and *Bingham Well* weighed three Grains and a half lighter;

lighter than the River Water; that is, near twenty nine Grains in a Pint; the Bath was four Grains lighter than these, *i. e.* thirty three Grains in a Pint. I put some of each of those Waters into three different Glasses, set them into the Air Pump, exhausted the Air out of the Receiver, but scarce had we the least Bubble, only it was whitish, as if a little Flower had been mixt with it, and tho' I made what haste I could lest the Water should cool in the Bath Room, yet it weighed two Grains heavier when I had done, *i. e.* fifteen Grains in a Pint. *March 17*, early in the Morning, being a hard Frost, strong east Wind, and some Hail, I made a fresh Trial, and the Bath was seven Grains lighter than the River Water, *i. e.* near fifty eight Grains in a Pint. *St. Annes* and *Bingham* were each six Grains lighter than the River, *i. e.* about forty nine Grains lighter than common Water, and nine Grains in a Pint heavier than the Bath.

April 17, the Air being pretty temperate, the last two weighed only four Grains and a half lighter than common Water, *i. e.* thirty six Grains in a Pint. I took up a Pot of each of those Waters, and a Pot of common Water, set them upon a Table in my lodging Room, that they might be of an exact Temperature, next Morning all three weighed a grain and a half lighter than common Water, *i. e.* twelve Grains a Piece in a Pint lighter; the last taken up, let stand till it settled, and let fall all its grosser Parts, then heated to the same Degree of Warmth with the Bath were near of the same Weight.

As to the Warmth of these Waters, I took a Thermometer whose Tube was fifteen Inches long, and the Diameter of its Bore was one twenty third of an Inch, and filled it only so high with Spirits, that on the fifteenth of September (as above) when the Thermometer was set in *Buxton* River, the Spirits were two Inches one fourth above the Ball. This Tube set in the Bath one quarter of an Hour, the Spirits rose four Inches six eighths higher, that is, to seven Inches. *St. Annes Well* brought the Spirits down one fourth of an Inch in the Tube, *Bingham Well* brought them still five eighths of an Inch lower. This Evening the Sky cleared again, and all East, North East, and North West up to the Zenith was covered with *Aurora Boreales* or Streamers, the Air very calm: Next Morning a small Frost, the Spirits in the Thermometer were only one Inch above the Ball, that is, one Inch and one fourth lower in the Tube than they were the Day before; I set the Thermometer in the Bath Room half an Hour, the Steam raised the Spirits one Inch seven eighths higher; then I set them in the Bath thirty five Minutes, and they mounted up to the same Height they were the Day before. *December 27*, 1731. being perhaps the

coldest Day that has been in *England* this Age; a strong North Wind and a clear violent Frost, which in seven Hours time bore Horse and Rider, tho' it rained and snowed the Night before till two a Clock in the Morning. The Spirits in the common Thermometers were at excessive Cold, tho' the Glass I observed hung in a Stair Case between two Rooms with continual great Fires, and the Door of one Room never shut, nor was there any outer Door near. The Spirits in my small Thermometer were more within the Ball than would fill an Inch of the Tube: Both Thermometers set in a Pitcher of River Water that Moment taken up where the River was most frozen, the Spirits in the first Thermometer presently rose six Minutes or Degrees, those in mine just filled the Ball. Three fourths of a Pint of boiling Water put to three Pints of this River Water, raised the Spirits in my Thermometer to the exact Height that *Buxton* River did *September 15*; and one Pint and a quarter more boiling Water added brought it just to the Warmth of *Buxton* Bath: That is, it raised the Spirits in the Thermometer to the very same Height. So I take these two for the great Extreams of Cold and Heat, all the rest being intermediate Degrees. *January 10*, being cloudy Weather, sharp Frost and some Snow, the Spirits in my Thermometer filled not the Ball; I put it into *Bingham Well*, and the Spirits rose a little above the sixth Inch, removed thence into *St. Annes well*, they ascended one eighth above the seventh Inch, carried from thence and set in the Bath, they rose to seven Inches five eighths and there stopt. *May 27*, being a very stormy Day with a raging Wind and great Rain, I tried two new Thermometers with fresh Spirits, the Bore of the larger Tube was one twenty third of an Inch, that of the lesser was one twenty seventh of an Inch, I put both in the River which was then in a Flood, the Spirits in the smaller were hid within the Ball, those in the larger were one Inch and three eighths above the Ball; I removed both into the small Spring beyond *Bingham Well*, the Spirits in the small Tube rose eight Inches, and those in the larger Bore seven Inches, that is, to eight Inches three eighths; both taken out here and put in *Bingham Well*, the Spirits in the smaller Bore got up to eleven Inches, and in the other to nine Inches; both carried and set in *St. Annes Well*, the first rose to fourteen Inches five eighths; both put into the Spring beyond the hot Bed, which rises up in the Level that carries the Water from the Bath, the Spirits in both Thermometers rose one eighth higher: I carried them thence and set them in the Bath, the small Bore rose to fourteen Inches three eighths; with this last I stript and went into the Bath, and put it upon the Spring at bottom next the Pump, and it rose to fourteen and a half; then I removed

removed it into the second Spring, which rises out of the black Rock, and it yet ascended one sixth of an Inch higher; but here the Tube being but sixteen Inches long, the Air above the Spirits was compressed into so narrow a Compass, that its Resistance was too forcible for the Ascent of the Spirits. Then I suspended the Spirits upon the Surface of the Bath, and the Spirits fell down to fourteen Inches one tenth; so that when the Bath is full, the second Spring is one hundred and seventeenth Part warmer than the first, even in this whole mixture of Water, and the bottom of the Bath is one fifty sixth Part warmer than the Surface. It is pleasantly surprizing to stand in the full Bath, and see the Exhalation of the compressed and rarefied Air, and sulphureous Steam, continually playing on the Waters Surface; like the Transition of the fiery Particles in scalding Water before it boil and is calm and clear, or just as if a Cloud of small Flies were rising up, whose Feet raised a small but general turbid Motion on the Top of the Water; common Water made of the same Warmth with the Bath, the first thirty Minutes the Water cooled faster than the Bath by one hundred and twelfth Part, but then the Bath Water cooled sooner by one hundred and eleventh Part.

Neither Dr. *Lister*, Sir *John Floyer*, Dr. *Leigh*, nor *Allen*,^a in their treating of these Waters, have once attempted to give us the Quantity of

^a Dr. *Lister de Aq. Medicat. Angl. exercit. prior* p. 35. says we have warm Baths in *Derbyshire* called *Buxton Wells*, which he had seen, and they are tepid Waters. It is a notable Spring and throws forth much Water, it is arched over for the more convenient Bathing. At first going into the Bath Room the Air seems very warm, and except the Windows be kept open all Day, one would find it uneasy to bear the Heat of the Place; there is a constant Steam sitting upon the Surface of the Water, and that even at the Summer Solstice at the Place where the Bath discharges it self. The Water seems Warm to none at first going in, but in a few Minutes you wonder, that you did not perceive it warm before; it soothes all the Members of the Body with such a pleasant tepid Heat. If you put your bare Foot into the Water as it bubbles up, you will find it manifestly tepid, it smoaks strongly most Part of the Year, especially in Win-

ter. There are some other tepid Springs besides the Bath, whereof one is *St. Annes Well*, which is the drinking Water; if you swallow much of it, it vomits. These rise out of a black Limestone under which is Pit Coal. These Springs are very clear, and scarce deposite any Clay or Earth, and tho' they are not of the atramentous Kind, yet they plainly taste of Iron. Out of four Gallons of each Spring exhaled, he had scarce a Scruple or two of Salt, without any stony Parts; this crystalized into common Salt chiefly, among which were interspersed some few crystals of Limestone, p. 134. These Waters are very wholesome for Bathing in, for they warm the Blood and other Humours, cause Sweat, move the Belly, and are diuretic. If their Use is too long continued, from their Effects the following Symptoms necessarily follow, *viz.* Leanness, Thirst, Weakness of the Bowels, especially of the Stomach. Both I and others, weak and strong,

Water these Springs throw out in any given Time; this I endeavoured to satisfy my self in, and I find it as follows: St. *Annes Well* throws out three hundred and ninety Gallons of Water in an Hour, or nine thousand three hundred and sixty Gallons in a natural Day and Night, or three Millions four hundred sixteen thousand and four hundred Gallons in a Year, twenty four Quarts of this Water exhaled in Winter left seven Scruples of Sediment; six Quarts of it exhaled in May left thirty five Grains of Sediment, seventy of the first was Earth, the rest a very beautiful white Salt; nineteen of the last was Salt, the rest Earth: So that the Proportion of Sediment to the Water, is near as one to two thousand five hundred and sixty; the Proportion of Salt to the Water (allowing one half Salt and the other Earth, which, upon repeated Tryals, I have found pretty near the Truth) is as one to five thousand one hundred and twenty, or a little more. Now three Millions four hundred sixteen thousand and four hundred divided by two thousand five hundred and sixty, the Proportion of Sediment to the Water, then this Spring throws forth in one Year six hundred

strong, observ'd this peculiar to those Waters, in *Balneo immerfi mingendi Cupiditate sapius teneri, imma involuntaria sapius mingere, puta quater minimum aut pluries, intra dimidium Horæ*; the same Effect he found in the Bath Waters. Thus far he; and you see how cautious he is that he run not out in the Commendation of this or any other Mineral Water, tho' he says most of its praise.

Dr. Leigh Book i. p. 31. &c. tells us that the warm Waters at *Buxton* rise out of a Bas; they are sulphureous and saline, yet not foetid, very palatable, because the Sulphur of those Waters is not united to Vitriol. It tinges not Silver nor is purgative, by reason its saline Parts are dispersed in such small Proportion, which saline Particles make up a compound Salt, constituted of marine Salt, and the *Sal Catharticum Amarum*, which the *Nitrum Calcarium* that impregnates *Epsom*, *Northall*, *Dulwich*, and the other purging Waters of those Parts. These Waters drunk create a good Appetite, open obstructions, and no doubt, if mixed with the chalybeate Waters that are there, may answer all the Intentions of the Bath Waters in *Somerset-*

shire, and that of St. *Vincent's* near *Bristol*, so noted for curing a *Diabetes*, of which I have seen several Instances in these Parts; and likewise for curing of bloody Urine arising from the Weakness of the urinary Vessels, of which he saw a most noted Instance in *Liverpole*. This Bath is of a temperate Heat, and without Question by reverberating the *Halitus*, might be brought to any Degree of Heat. But I think in its own natural Heat, it may in general be said to be more agreeable to the Constitutions of those Parts, and where the hot Baths cannot be safely used this may; he was Witness the Summer before to its surprizing Effects in scorbutic Rheumatisms, in Persons that could not go before without the Help of Crutches, who came from thence to *Manchester* on Foot without them, viz. sixteen Miles. Where sulphur Waters tinge a copper Colour, it is from the Addition of a vitriolic Salt, as *Harrigate*, other sulphur Waters tinge Silver of a golden or yellowish Colour, as the Bath in *Somersetshire*, there is a greater Proportion of sulphur and little Vitriol: But if they tinge none at all, it is all Sulphur and no Vitriol, as *Buxton*.

and

and seventy one Gallons of Salt, and as much stone Powder, which added together, make thirteen hundred and forty two Gallons of Sediment in a Year.

The inner Bath is twenty six Foot, six Inches and a half long, twelve Foot eight Inches and a half broad, and four Foot six Inches deep of Water; the outer Bath is seventeen Foot long, ten Foot two Inches broad, and five Foot six Inches deep. Then the inner Bath contains one thousand five hundred and seventeen cubical Feet of Water, and near seven eighths of a Foot; and the outer Bath nine hundred and twenty one solid Feet, and three fourths; both added together, make two thousand four hundred and thirty nine, and $\frac{63}{100}$ cubical Feet of Water; but supposing a cubical Foot of Water to contain about $7\frac{1}{2}$ Wine Gallons, and the Springs of the inner Bath affording Water for both, and both being filled in two Hours eight Minutes (let us allow the eight Minutes for the lost or waste Water which yet is too little by much) then the Springs of the inner Bath throw out in two Hours, eighteen thousand two hundred and forty nine $\frac{63}{100}$ Gallons of Water; Six Gallons of which I exhaled, and it left six Scruples of Sediment, that is, one Scruple to a Gallon, or forty seven Pound eight Ounces and three Drams of Sediment in two Hours, two Parts whereof being Earth, then stone Powder thrown out in that Water in the foresaid Time is thirty one Pound eleven Ounces forty Grains, the Salt is fifteen Pound thirteen Ounces four Drams and twenty Grains. The Water thrown up by this Bath in a Year (seeing its Springs are always of the same Speed) is seventy nine Millions, nine hundred and thirty thousand, six hundred and twenty Gallons (multiplying two by twelve the number of Hours in a Day, and that by three hundred and sixty five, omitting the Fractions of Water and Sediment) the fixt Parts whereof are two hundred eighty thousand seven hundred and eighty Pound, eleven Ounces and seven Drams, one third of which being Salt amounts to sixty nine thousand five hundred and ninety three Pound seven Ounces and one Dram in a Year.

When the old *Earl of Shrewsbury's* Building was demolished about sixty Years ago, and a new Edifice erected by the then *Earl of Devonshire*, this Bath suffered two irreparable Losses of its greatest Ornaments, viz. The Registers, wherein were written and preserved for some Hundreds of Years, an Account of the most remarkable Cures, whether inward or outward, put down and signed by the cured or eased Patient, or written by the attending Physician, or in his absence by the Bath Keeper, and subscribed by the Persons own Hand; for an Account of the Diseases however we are indebted to Dr. Jones, who perused

used the Registers when extant, which were of Service to him in composing his Work. The other noble and beautiful Piece of Furniture lost, were the many Rows of Crutches left hanging in two large Rooms, as the lasting Monuments of the happy Delivery of so many lame, halting, pained, and tortured Wretches, by the Use of this bountiful Largess of Heaven. Is it possible that wise or thinking Men should be the Destroyers of those? for had they built State Rooms of the finest Marble, overlaid them with Gold, set with Rows of the richest sparkling Diamonds, and had their Floors painted by the most masterly Hands, in the finest durable Colours, with the lively and true Emblems of the most distant, dark and valuable Histories, and had their Tables abounded with the Luxury of *Heliogabalus*, yet were all this but paltry Stuff to sick People, in comparison of the others. What mean Cordials were these tawdry glittering Materials to the afflicted, pained or lame, in comparison of seeing at his first Entry, so many Trophies of Victory? And let them step but a little further, and see a Shelf most beautifully adorned with faithful Narratives, containing an Account by our antient, honest, undesigning Ancestors, of thousands of Cures done in their very Diseases, with the sundry Methods pursued, and the various Effects. Only Ignorance or Envy could prompt to the Havock of that, which no Place in *Britain*, or perhaps in *Europe* besides, had to glory in, and show in such Plenty^e.

Bingham Well affords an uncertain Stream, being sometimes higher, sometimes lower; but when I examined it in a great Drought, it discharged seventeen Hundred and fifty eight Gallons of Water in an Hour. Six Quarts of this Water exhaled, left thirty three Grains of Sediment, twenty whereof was Salt. Then this Spring sends out thirteen Millions, six Hundred and forty seven Thousand, one Hundred, and eighty Gallons of Water in a Year, which carries in it forty eight Thousand three Hundred and sixty eight Pound of fixt Sediment, near two thirds of which being Salt, it affords thirty two Thousand two Hundred forty five Pound, five Ounces, two Drams, and two Scruples; the rest

is

• Tho' the Bath in *Somersetshire* be now very much frequented, and justly arrived at great Fame and Grandeur, yet if we look back to Dr. *Turner's* Time, who wrote only fifteen Years before Dr. *Jones*, and published his Book ten Years sooner, we shall find from the poor Circumstances and Obscurity it was in then, that *Buxton* had the Advantage of it. In his Preface

he says, I have written so well as I can of the Bath of *Bath* in *England*.

Whereof that I wote of no Man hath written one Word, that ever I could read, and p. 1. he thus begins, "Although there
" be a very excellent and wholesome Bath
" within the Realm of *England*, yet for all
" that, I reckon that there are many in the
" North, and North-west Parts of *England*,
" and

is Earth, beside a Fragment of twelve Ounces and a half of Sediment. The little Well of warm Water, thirteen Yards East of *Bingham* Well affords Seventy eight Gallons and a half of warm Water in an Hour, or six Hundred eighty seven Thousand, six Hundred and Sixty in a Year.

All these four warm Springs together throw forth in a Year ninety seven Millions six Hundred and eighty one Thousand eight Hundred and sixty Gallons of Water, besides the waste Water that gets out of the Bath, and the strong Spring rising up in the Middle of the Bath Level beyond St. *Annes* Well, and the warm Water which rises up in the hot and cold Spring, and lastly the two small warm Springs which rise up in the low Ground, between the hot and cold Spring, and the large Spring in the Sough, with several other ouzings of warm Water in sundry other Places, the whole added together will be near double this Computation.

All these Waters brighten the Solution of Gold, and first make the Solution of Silver white, then turbid, after which it lets fall a large white Sediment. They turn Solution of Iron and Mercury yellow. Solution of Sublimate turns them first of a small Pearl, clear, and by long standing, muddy, and blackish. They presently become white by Solution of Sugar of Lead, then let fall a large Sediment. Oil of Tartar makes them first of a blueish White, and in one Night and Day

“ and some in the East Parts, which being diseased with sore Diseases, would gladly come to the Bath of *Bath*, if they knew that there were any there, whereby they might be holpen, and yet know not whither there be any in the Realm or no.

He that had been in *Italy* and *Germany*, and had seen how costly and well favouredly the Baths are trimmed and appointed there in diverse and sundry Places, would be ashamed that any Stranger, which had seen the Baths in foreign Lands, should look upon our Baths; for he would think that the Stranger would accuse us *Englishmen* of three Things: Of Grossness and brutish Ignorance, because we trim our Baths no better; of Unkindness, because we do so lightly regard so high and excellent Gifts of Almighty God; of beastly Filthiness, because we make no Partition between the Men and the Women whilst they are Bathing, but suf-

fer them contrary both to the Law of God and Man, to go together like unreasonable Beasts, to the Destruction of both Body and Soul of very many. If there be any liberal Duke, Lord, Knight or Squire, &c. that will bestow any Cost upon the bettering and amending of those Baths, I for my part having no other Riches, will forward it with my Counsel thus as I can. Let every Bath have a Hole in the Bottom, by which the Bath may be cleansed and scoured every twenty four hours. It were meet that every Bath had a covering above it, &c. whereby we see their then low State: Though he says they had been then known a Thousand Years, but either thro' the Ignorance or Enviousness of Physicians in former times, they would not send their Patients whom they could not otherwise Cure, to the Bath. For very few in times past have been sent thither by the Advice of Physicians.

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you have a Sediment of the same Colour half an Inch high; Spirit of Vitriol, and the Oils of Salt and Sulphur turn the Water rather clearer and finer, tho' they raise a visible intestine Commotion, and the Sides of the Glasses hang full of Air Bubbles. Spirits of Hartshorn or Sal Armoniac change it to a whitish clear, and upon twenty four hours standing leave a small Sediment like Wool or Cotton. Syrup of Violets made it first blue, then greenish. Syrup of Cloves, a whitish blue and muddy. Tincture of Fustick, of a pale Sack colour. Tincture of Logwood of a beautiful Red. Tincture of Galls of a muddy yellowish Colour, which in four Days standing turned Green. Green Tea altered it not. Tincture of red Roses gave it a Brandy colour. Rum, Brandy, Balauftian Flowers, Pomegranate Peel, nor Oak Leaves made no Change.

Bingham Well mixt with the foresaid Ingredients separately in sundry Glasses, and let stand all Night; next Morning, that with Solution of Silver, was of a Pearl, clear a-top, and a large Sediment. With Tincture of Rhubarb, of a yellowish brown. With Solution of Sublimate, the Liquor was clear, but the Sides and Bottom of the Glass were blackish. With Spirits of Hartshorn, of a blueish Green. With Tincture of Fustick, yellowish. With Tincture of Brasil, a light small Red. With Tincture of Logwood, deep reddish brown. With Tincture of Galls, a deep purple Scum above, yellowish in the middle, and a blewish Pearl at top and bottom. With *French* Brandy of a darker clear than common Water.

The Differences between this and *St. Annes* Well were very small, the first made Solution of Silver of a bluer white, and afterwards of a more purple Colour than the last, it was also reddish a greater space with Syrup of Cloves; it let fall more Sediment with Solution of Lead; its Sediment left after Exhalation was more pungent and saline, and very white. Eleven Quarts of it at another time leaving thirty three Grains of Sediment, twenty four whereof were a white Salt, which changed Syrup of Violets to a beautiful light green Colour, but the Salt of *St. Annes* Well made little Alteration upon it; the first also turned Solution of Sublimate a little Orange coloured, and mixed with *Sal Armoniac* sent forth an urinous smell. It crackled a little on a red hot Iron, and blebbed not much. It fermented strongly with Acids, but not with Alcalies.

Bingham Well Water being fetched sixteen Miles, and kept five Nights, I compared it with common Pipe Water which had stood two Nights in a leaden Cistern. Tincture of Rhubarb turned common Water of a light yellow Colour. *Bingham* Water, of a reddish or reddish

reddish brown. Solution of Sublimate changed not common Water, but occasioned a Scum over it of red, blue, and yellow, according to the sundry direction of the Rays of Light. *Bingham* Water became whitish, and had a Scum of yellow, red, green, and blue. Oil of Tartar made no Alteration on this common Water, but the other was first white, then crudled, and let fall large whiter Flakes at the Sides and Bottom of the Glas. The acid Spirits raised a greater intestine Motion, and more Bubbles in the mineral Water than in the other. Spirits of Hartshorn had no Effect on the last, but changed the other white, which became also greener with Syrup of Violets, more than the common Water. After four days longer standing, Tincture of Brasil Wood had turned *Bingham* of a deeper red than the other, and Tincture of Galls, Sumac, &c. had changed the first Green throughout. Solution of Silver had made it of a light Purple, but the common Water was a pale Pearl.

When I had kept the Bath Water, *Bingham* Well, and the hot and cold Spring Water, till they were at their highest degree of Pulverisation, then with Tincture of nephritick Wood, they were all whitish first, then pale, lastly crudled, and became green. The second of these with Solution of Silver, Tinctures of Galls and Sumac, was red; Bath Water, with Solution of Silver, was reddish, but soon changed to a Pearl. With Tincture of Galls, both it and the third, were first of a muddy clay Colour, then leaden, covered with a variegated Scum; but the Bath, with Tincture of Sumac, was wholly green in five Days. Syrup of Violets turned *Bingham* Well very green in two Days.

I exhaled each of those Waters several times, and always found some difference in the Quantity of their Sediments, but never of their Kind, the last being always the same; the first varied, sometimes from the Water, sometimes the Fire, sometimes the Vessel. Not only the Sediment, but the Salts fermented with Oil of Vitriol, they also crackled in the Fire, and swelled a little; but finally, to be satisfied of both their Kind and Proportions, I set them to crystalize. The Bath afforded both Sea Salt and Nitre, but most of the first. The Salts of St. *Annes* Well were the same, only there was more Nitre than in the Bath. *Bingham* Well contains most Nitre of any of them, and less marine Salt. I took the Crystals of Nitre from the marine Salt, dissolved them, and set them to project into regular Crystals, that I might obtain their true Figures, which see in the Plates.

From the preceding History, we draw these Observations, viz.

1. That tho' there is plenty of Ocre, Ironstone, and Sulphur in the Coal-pits here, which are generally reputed the Cause of hot Springs,

yet the Water is so far from warm, that it is intensely cold. Hence to cause Warmth, there must either be some other Materials, or there is a Mixture of other Ingredients which prevents their Effect in warming the Water ; or these are mixt in undue Proportions.

2. Again, since we find the Veins of Lead crossing the Coal corroded, it is plain that Vitriol acts upon, and consumes Lead, as well as other Metals.

3. Since Limestone and Coal cannot agree, we see that the alkaline Earth of the first, is as hurtfull to the Acid of the last, as this Acid is prejudicial to Limestone; for that it is not the Nitre in the Limestone that is hurtful to the Coal appears from this, that most of the Chalybeat or Vitriolic Waters contain also a fixt Nitre, which exist together.

4. Cannot we find good Lead, either where there is dissolvable Vitriol, as in Coal, or even in a neutral Earth, wherein is much Ocre, or where this *Lapis Calaminaris*, or Copper Ore are? then this shews us the Delicacy and Dissolubility of this Metal, by the smallest Acids.

5. However homogeneous *Buxton* Waters may appear in all other respects besides their greater Heat, and of the Nature of common Water otherwise, yet seeing several of the above tincturing Ingredients, produced in them Phænomena differing from those of common Water, therefore it must contain some other Principles than those of common Water.

6. Tho' it cannot be denied that this Water has a Mixture of different Principles, yet seeing it is still eight or ten Grains in a Pint lighter when cold than common Water, this shews that it has less earthy or other gross Parts in it than River Water.

7. Does common Water made of the same Warmth with *Buxton* Bath, cool sooner at first, but slower than it toward the latter end? then *Buxton* mineral Water has either less gross foreign Matter in it, or this Matter exists in smaller Particles in the Water, and gives less Resistance to the flying off of the less rarified Particles of Heat.

8. Seeing *Buxton* Water is so much lighter and warmer than common Water, before it has received any culinary or artificial Fire into its Pores to rarefy its Air, it is plain it brings that along with it which is equal to the fiery Particles in heated Water, which being occasioned from this Waters washing mixtures of several Minerals, we shall therefore call that a Mineral Vapour.

9. Since this Water washes so many Ingredients abounding with Sulphur, and we find that even gross Sulphur by the Mediation of Limestone communicates some of its Parts to Water, and also seeing there

there is constantly such a visible Sulphureous *Halitus* upon the Surface of the Water, then it is reasonable to think, that this Water, whilst warm, is impregnated with a Sulphureous Steam or Vapour, as one part of its mineral Spirit.

10. From the whole Processes of Experiments, it is plain that the Minerals warming and impregnating those sundry Springs are the same only differing somewhat in the Proportion of their Ingredients.

11. These Minerals lie in a *Stratum* or Bed from West to East.

12. Since *Bingham* Well increases or decreases upon vicissitudes of Weather or Seasons, then its Spring is not supplied from any great Depth in the Earth, but chiefly from the Surface of the Ground and small Hill above, and seeing both it and the small warm Spring beyond it (which I have seen quite dry) are so superficially provided and yet warm, the impregnating Ingredients seem not to lie very deep in the Earth.

13. Since these Waters continually bring up so large and numerous Bubbles with an impetuous Force from the Bowels of the Earth, then must their Interstices be richly stored with this fine Air.

14. Seeing St. *Annes* was known to be of the same Nature, and threw forth the same Quantity of Water before the Bath Level was made that it does since. And since from this Well to the Bath is a continued Rock of firm black Limestone, or between Marble and Limestone, especially seeing the main Spring which supplies this Well, rises up through a black Limestone on that Side next the River, and not on that next the Bath; but finally, since we find the two considerable differences in its Contents from those of the Bath, it is ridiculous to suggest that this Spring has any Communication with the Bath.

15. Since there is such difference at sundry times in the Weight of these Waters, it follows that there is no certain Standard for the specific Gravity of these Waters, only this in the general, that they are lighter than other common Water; and that the lighter they are, so much more impregnated with the Mineral Spirit, and the less extraneous Bodies they bring along with them; and the lighter it is, the warmer; and the warmer, the more Medicinal.

16. The more the Pores of the Earth are locked up by Frost, or filled with Water, so as it affect not the Springs, the warmer and lighter is the Water; and the warmer it is, so much stronger is its mineral Vapour, and therefore the more powerful are its Virtues.

17. Seeing it did bubble in the Air-Pump, not the separability and slipperiness of its Parts, its freedom from Viscidity and Tenacity, it not giving

giving any visible Resistance to the egress of the Air; how fit therefore a Vehicle is it to thin gross fizy Humours, or divide the more firm, earthy or salt?

Did it weigh heavier after it was taken out of the Air-Pump, even though it in a good Measure retained its Warmth? then it must have lost some of its Parts, but these being neither the Vehicle nor fixt Contents, they must therefore be the Air or Spirit.

18. From the Use of the Thermometer, we see *First*, the different degrees of Heat of the fundry Waters. *Secondly*, We find that there are different degrees of Heat of the same Water in the fundry Seasons of the Year, and Temperature of the Air. *Thirdly*, That these Waters are not relatively, but absolutely warmer in Winter than Summer, in Frost, than fresh Weather, in a cold Season, than hot, the Bath at least being one twentieth part warmer in Frost or Winter, than in warm Weather. *Fourthly*, That in a great Frost, four fifths of the coldest Water not frozen, and one fifth boiling Water mixt, make the just Warmth of common River Water in hot Weather about the autumnal Equinox. *Fifthly*, That a Quart of boiling Water put to three Pints of such cold Water, in an earthen Dish, at two fundry times, about seven Minutes distance, gives the true Warmth of *Buxton*. Or five eighths of a Quart of boiling Water, put to three Pints of common River Water in Summer, gives the exact Heat of *Buxton* Bath in that Season, and then whatever raises such a Thermometer five eighths of an Inch higher, shews you the Warmth of *Buxton* in a strong Winter Frost.

19. By these Experiments we have the Quantity of Water each Spring sends forth in a given Time. *Secondly*, The Proportion that the Vehicle and fixt Parts have to one another. *Thirdly*, The Proportions of the Earth and Salts separately. And, *Lastly*, Which of the different Salts exceeds the other in Quantity.

20. From the small Quantity of the fixt Parts in those Waters to their Vehicle, especially considering the small Quantity that should be daily drank, it is plain these Parts can do little to the removal of any obstinate chronic Disease. Suppose *e. gr.* a Man daily drink four Pints of Water, at most he swallows not with this Dose, above five grains of Limestone Powder, which we shall call an alcali or absorbent, and two Grains and a half of Marine Salt, and as much Nitre, which let us suppose stimulant, What can these do? Nay, let him drink half that Quantity of common Water that comes from the white Limestone Hills, and he shall have as much alkaline Earth, if not some fixt Salt, besides a vegetable Salt, yet who would call these Medicinal Waters?

Waters? Hence it is plain, that the Virtues of our Waters consist first in the pure, smooth, fine common Vehicle, then in its Warmth and Mineral Spirit.

21. Is the Bath, when its Doors and Windows are shut, warmer than when opened? Is the Bath that is shut up on all Sides, warmer than *St. Annes Well*, which is only shut up on three Sides? Is this warmer again than *Bingham* that is wholly exposed to the open Air above and on all Sides? then it is plain, were these Waters kept close covered, and their Heat reverberated, they might still be much warmer, which *Mr. Taylor* who is a generous Well-wisher of Mankind (and spares no Charges to promote the Usefulness of the Waters) designs to do upon *St. Annes Well* at his own Expence.

22. From the Experiments with the Mixtures, we see first from the intestine Motion excited by the acid Spirits, that the Water contains an Alkali. *Secondly*, Which being precipitated by a Solution of Sugar of Lead, or the Water thrown into an Alembic and distilled, and that which comes over with a slow Fire tried, neither of these Waters ferment with Acids. *Thirdly*, Not only the Alcaline Nature of this Earth, but its Whiteness shew it to be Limestone Powder, though it warm not the Water after Calcination. *Fourthly*, This Earth being calcined in a Furnace which quickly melts Iron, and then applied to the Loadstone, it attracted this Dust or Powder briskly, therefore I conclude it contains also Ironstone. *Fifthly*, Seeing the Water precipitates the Solution of Silver, and a Part of its Salt crystalizes into Crystals of a Cubic Figure like a Die, then a Part of its Salt is marine Salt. *Sixthly*, Since it lets fall a Sediment with Oil of Tartar, and Spirit of Hartshorn, &c. and also affords some long Crystals with six unequal Sides, terminating at each end in a Pyramid under several Triangles; we say it contains also Nitre. *Seventhly*, Seeing neither Galls nor other Astringents altered this warm Water, we cannot trace any Vitriol volatile nor fixt in it, nor does it taste Chalybeate, however several peoples Faith may be before hand with their Taste, and tho' the Loadstone does attract some of its calcined Earth, the same it does with most other Earths, which never afforded any Solution of Vitriol, or any Appearance of it. *Eighthly*, Did *Bingham Well*, when putrified, and its Sulphur spent become Red with Galls, and Purple with Solution of Silver? then it partakes more eminently both of Nitre, and has more of the Chalybeate Principle in it, than any of the rest.

23. Did these Waters afford sundry Proportions of Sediment at different times, then they are not continually alike fraught with their fixt Mineral Principles at all Times. *Secondly*, We may hereby observe that

that when their fixt Contents are least, their volatile Principles are most, as in Winter and very cold Weather; and when their volatile Spirit is smallest or weakest, their fixt Parts are encreased, as in very dry and hot Weather. *Thirdly*, Have several Authors examined the same Waters at sundry Times, and found their Contents differ in Quantity, but not in Kind? then are they not to be arraigned and accused about small Differences, as is ordinary.

24. Does Dr. *Lifter* tell us, That *St. Ann's* Water vomits, upon swelling down large Quantities? This is nothing peculiar, but what it has in common with all other Water. *Secondly*, Does he assert a Quantity of Pit-Coal to lie immediately under the Limestone, out of which this Water Springs? It is surprizing how so good a Naturalist could make such a Blunder; for 1st, Limestone and Coal are found inconsistent with one another, in the *Peak* Country. 2^{dly}, Who ever found warm Water in Coal? *Thirdly*, Tho' the Sediment of those Waters be very small, yet it at least affords a Scruple to a Gallon; tho' he obtained but one Scruple or two out of four Gallons; here must have been some Neglect or Mis-management. *Fourthly*, He says the Sediment was all Salt, and no Stone-powder, whereas the *Bath* yields above one Half, and sometimes two Thirds of Stone-powder to one of Salt. *Fifthly*, The Salt, he says, is chiefly Marine, tho' this be true of the *Bath*, yet *St. Ann's* Well contains as much Nitre as Marine Salt, and *Bingham* more than either of them. Nor, *Sixthly*, can I here overlook *Allen's* Account of this Water. For, *First*, he will have but three warm Springs here, viz. two for Bathing, and one for Drinking: Now the outer *Bath* is no Spring, but supplied from the inner *Bath*. *Secondly*, He says, it is the Warmth of Blood, new let out of the Vein; but had he used a Thermometer to both, he would have found the first much short of the Heat of the Last. *Thirdly*, He will have Lead, Iron and Sulphur to be the Principles that medicate this Water; but how can Lead communicate any of its Parts to the Water, without it be dissolved? where is the Solvent or Menstruum? and if it had a Solvent, it would be Vitriol, which would long ago have corroded and consumed the Lead, and left only a bright Sulphur; and since Lead is the chief medicating Principle, the Springs would now be no more than other common Springs. But allowing (contrary to Reason and Experience) that the Lead did still impregnate this Water, it would be Poyson instead of Physick, as we see from the Accidents that happen to Smellers, and Animals that drink the Waters wherein is Lead, how soon they are seized with a Bellan, and from the Effects of Sugar of Lead taken inwardly. Nor, thirdly, has the Water a sulphureous Taste

Taste or Smell as he alledges. Nor, *Fourthly*, do Galls give this the same Colour as they do the *Bath* Waters, nor a leaden Colour, which he will have from Lead. The Sulphur he will have to be that of Lead. *Jones* is much righter where he thinks the Water is too pure, delicious and fine for any such Principles as Lead, Copper or Alum, and contents himself with an impalpable Sulphur. *

Now let us see what medicinal Uses these Experiments and Observations will help us to make of these Waters; which are improvable by Mr. *Martin's* Account of the Effects of warm Bathing, ^a where-
by

* Dr. *Allen*, in his *Natural History of Mineral Waters*, printed 1711, Page 39, says, there are three Wells here of ancient Use and like Nature, two for Bathing, and one for Drinking; they are of the warmth of Blood fresh drawn, the chief Mineral here is Lead. Mr. *Bishop*, the Schoolmaster there, informed him, that there was Brimstone and Antimony in all Minerals thereabout; but *Allen* thinks by Antimony is meant Lead, Spelter or Tingleas. The Water has a sulphureous Taste, and gives a brown Colour with Gall, like the *Bath*, but darker as Lead gives; and there is a Chalybeate not far off; so Lead, Iron and Sulphur are the Principles which medicate this Water; the Sulphur is not so much in Quantity, nor so distinct, but a sulphur of Lead, or in the State of leaden Marcasites. This

Water changes not the Colour of bright Silver, for it wants the sulphureous Acid, at least in Quantity. The Mines lie in Stone, and there is no Mud thrown up with the Water, to examine. But the Aporrhea may be as much, and as strong, if depth, firmness of the Rock, and the Quantity of the Mine, which are Signs, may be a Proof.

^a *Philosoph. Transactions* N^o 407. Pag. 26, and 27. The Spring which is now used for Bathing, appears to be $32\frac{1}{2}$ Degrees of one of Mr. *Hawksbee's* Thermometers, warmer than the common Spring Water there, for the common Spring Water kept the Spirit of Wine at 41, the *Bath* Water raised it to $8\frac{1}{2}$. Statical Experiments on the Effect of cold Bathing, having been seldom made, the few following cannot be unacceptable.

July 21, 1728. H 10 $\frac{1}{2}$ at Night.	Weight lb 3	After Bathing 12 Min	Urine. 3 3	July 22. H. 8 $\frac{1}{2}$ Morning	Weight lb 3	Urine 9 $\frac{1}{2}$	Weight. 20 M. af- ter Bath ing.		
A	137 12	137 11 $\frac{1}{2}$		A	136 9	9 $\frac{1}{2}$	135 15		
B	134 15 $\frac{1}{2}$	134 13 $\frac{1}{2}$		B	134 1	7	133 7	136	
C	169 15	170		C	168 13	13	167 11	133 11	
D	119 6 $\frac{1}{2}$	119 7	4	D	118	15	117	167 14	117
H. 11 af- ter eating, Cloaths changed.	Weight lb 3	After 1 $\frac{1}{2}$ h. Exer- cise in <i>Pools-hole</i> chiefly under Ground.	Perspir. 10 $\frac{1}{2}$ 3 13 3 8 $\frac{1}{2}$ 3	After Dinner, Cloaths changed.	Weight. lb 3	Perspir. in 1 $\frac{1}{2}$ h. all used moderate Ex- ercise in walk- ing, only D fat still reading all the while.	Servant who at- tended the Bath.	His Weight. 173 lb 4 $\frac{3}{4}$	After 1 h. Bathing weighed 173 lb 6 $\frac{3}{4}$ After he had per- spired 1 h. he weigh- ed 172 15 $\frac{3}{4}$
A	137 5			A	136 14	7 $\frac{1}{2}$			
B	140 7			B	142 6 $\frac{1}{2}$	3			
C	170 4 $\frac{1}{2}$			C	170 15	6 $\frac{1}{2}$			
D	117 8			D	129 1				

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From

by it is plain, *First*, That by the Waters penetrating the Pores of the Skin, it gets into, and mixes with the Blood, and other Juices, on the Bodies Surface, and thereby encreases its Weight. *Secondly*, That by this Insinuation of the tepid Steam into the Pores, the Skin is relaxed, its Pores dilated, the Fluids in the Capillary Vessels are thinned, their Motion made easier, and their Evacuation promoted. *Thirdly*, Tho' the Addition to the Bodies Weight by bathing may seem small, yet we must allow a considerable Discharge by Perspiration during Bathing, both from the Pressure of the Water, added to that of the Air, upon the Body, and the warming, relaxing Nature of the Water. But to proceed.

Since these Waters contain so much Air in their Interstices, they must be a very great Promoter of Digestion, except they be drank too long, and then from their very Warmth and Nature, they must relax the Stomach, and give a resty Fit to all the Digestions, except intermitted. But the Waters being warmed by Bodies of a different Nature, either brought together, dissolved, or set in Action by the Water, this Action cannot be without the Communication of some of their Parts, which little Parts must be lodged, together with the Air, in the Interstices of the Water, then not only does the Air (considered as a simple Æther) promote Digestion and Attenuation; but being springy, and full of those subtle, invisible, intractable Particles of Mineral Bodies, or Substances, of what a thinning opening Nature must they be in Animal Bodies? How near in smallness and subtilty do they approach to the Particles of Light and Heat, since we have no Vessels that retain one more than the other? And since they are not retainable in the cold Water, wherein we suppose the Air in a stagnant, compressed State, how trifling is it, to imagine or attempt procuring of them by force of Fire in Distillation, &c. whereby the Air is heated, rarified and expanded, and even their Vehicle, the Water so rarified, that it rises up in a Smoak, in both which they are at greater Liberty than before, to make their escape.

From these Experiments he concludes, *First*, That warm Bathing encreases the Weight of the Body at present, tho' it causes a plentiful Perspiration afterwards. *Secondly*, That the Perspiration after this Exercise is nothing near so large as Dr. Keil has delivered (*Med. Stat.* pag. 16.) it amounting by his Account to a Pound and

a Half in one Hours time. But by these Observations it is but five Ounces in one Hour, and from eight Ounces and a Half to one Pound, in an Hour and a Half, tho' assisted by Motion, which might have caused us to perspire (by Dr. Keil's Computation, *Med. Stat.* pag. 15.) from three to six Ounces.

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Since these Particles are so much less and more subtle than the most volatile Spirits, obtainable by Art, as those of Hartshorn, Sal Armoniac, &c. which may be shut up and preserved in so porous a Body as Glass, how impossible is it that the smallest Vessels in human Bodies, tho' never so obstructed, (if not grown up and become tendinous) should hinder their progressive Motion? Nay, will they not even find a Passage between the Interstices of the Fibres that constitute the Sides of the Vessels, much more in their Cavities? How well then must such a Water at the Spring-Head, thus fraught with its subtle Mineral Principle, be disposed to send on the Errand of opening and clearing the minutest Vessels in the utmost extrems of Animal Bodies? Or in the smallest Vessels of the *Periosteum*, in either of the Coats of the Brain, or Spinal Marrow, or in the Brain or Marrow it self? which are the smallest Vessels comprehensible by human Conception. From this it follows, that these Waters are better adapted to Obstructions, from the twentieth Rate Vessels, to the smallest in the whole Body, than to those of the Larger and first Rate: No Wonder then it produce surprising Effects in gouty, rheumatic, arthritic and scorbutic Pains, all which have their Seat in the small Vessels, yea so small as scarce to be come at by Medicines. Again, consider we this Spirit as wrapt up in Air, it is not only subtle and penetrating, but elastic or springy, so that when the heat of the Body is added to its warmth, it will be so much more springy, and expand the smallest Vessels, relaxing them, and so making room for the obstructing Matter either to be expelled the Body, or so thinned as to be thrown back into the larger Vessels, till it is more attenuated, digested, and fitted for Evacuation by some of the common Outlets. But is the Water thinning, and the Spirit elastic? then not only does the first dissolve the gross Humours, but the Particles of the second being got between them, and dilating themselves like a springy Wedge, will turn the attractive force of these Humours into a Repulsive, whereby they are gradually separated, broken, and mixt with the intercurrent Fluid; but as the Humours cannot be thinned and divided into smaller Particles without encreasing their Bulk, especially when at the same time there is a Quantity of this Water thrown into the Body, and mixed with them. This Fusion of the Blood disposes some of its Parts to get into improper Vessels, for one Globule being hereby divided into two or three, they are then capable of entering Vessels that before would not admit nor receive them when only one; and these Vessels being conical, the globular Parts thus divided must stop, before they can reach the extremity of the Vessel;

hence new Obstructions of another kind, from this powerful Diluter, which must remain, except either the Vessel relax and give Way, or the stopt Globule must be split into two or three others; but by this necessary Force, the Action of the Vessel is encreased, whereby the Blood's Motion becomes brisker: And now both the Blood, Quantity and Velocity are encreased, but the Coats of the Vessels not being hereby strengthened, but weakened, according to their greater Dilatation or Stretch, if they were weak before and full of Blood, then Hemorrhages must necessarily follow, except prevented by due and timely Evacuation, or Reduction of the Humours to their former Standard, that the Vessels may again be restored to their natural Dimensions, Strength and Resistance. But are we assured from Fact and Experience, that there is a mineral Spirit in these Waters, and want we to know the Nature of this mineral Spirit? let us get acquainted with the Minerals washed by the Water, and consider which of them are capable of a Separability of some of their Parts to the Water, and which they are that cannot be acted upon either by Separability or Dissolubility, and we are sure that this Spirit must be from the first and not the last, but what these Materials are we have seen before, therefore the Spirit must be of that Nature as its Effects as well as Theory prove. From the whole we see, that the Intention and Effects of those Waters are Relaxation and Dilution, and wherever these are indicated, this Water will be of the greatest Service, which is, when the natural and necessary Secretions are lessened, from whence Obstructions in the small Vessels; but it is of the greatest Benefit in those Obstructions which arise from a sharpness, saltness, or earthiness of the Blood and Lymph, or from an accidental (where there is no natural Disposition to a) Rarefaction of the Blood, some of whose Parts have mistaken their common Road, in all which Cases we suppose a *Stimulus* in the Vessels from Pain; seeing it is impossible the fixt Parts of this Water should give much *Stimulus*. Its Excellency reaches particularly to all Contractions, Stiffness, or Crispation of the Solids and Vessels, when their Parts are so close that the Fibres are inflexible by such Causes as, in a natural and healthy State, should bend them: Or there is a Difficulty, and Indisposition sometimes in the Fibres and Vessels, preventing their ready and easy Distention and Contraction, as is mostly the Fate of old Age and hard Labourers, which is evident from a more difficult bending and contracting of their Joynts and Muscles, and from their greater liableness to rheumatic and arthritic Pains; and if Youth be hard plied betimes in Life, its Fibres are sooner stiffened, stronger, and are at their Growth, or prevented of
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their full Growth, sooner; for by whatever means Growth is hastened and finished, the Period of Life is so much shortened. Hence such as are of the slowest Growth (living rationally and missing Accidents) live longest, for the same space of Time they take to Growth, they stand still as long, and decline the like Time; for should one Man grow till thirty Years of Age, from that he is at a stand to Sixty, and grows back again or declines to Ninety, then Dies: Suppose we another, who has unnaturally hastened his Growth at sixteen, he cannot out-live forty eight, or fifty at most: Hence it is plain, that such as rejoyce at their Childrens early Growth, and such as are uneasy at their slow Growth, are equally foolish. It is judiciously observed by *Sanctorius*, that from the time Men begin to decline and grow old, Perspiration is diminished, the gross Parts of the Blood are retained, which being gathered to the *Thorax* or Breast, are raised up by Coughing, or they are heaped up at the Extremities of the Vessels; the encreasing Stiffness of the Parts still occasioning a Waste of the more subtle Parts, and a Collection of the grosser: Hence Diseases from mucous or fizy Humours, laid up in one Part or other of the Body, as Catarrhs, Rheumatisms, Pains of the Joynts, Atrophies, Marasmus, and a gradual diminishing of the Actions depending on the small Fibres, as Hearing, Seeing, Memory, Judgment, &c. for the Vessels of the Brain being then partly shut up, and partly become callous, so as they are unfit for the more noble and elevated Actions, then the Person becomes childish, and wears out of Life without much Pain or Uneasiness, and all from a stiffened Fibre and diminished Perspiration.

Upon the whole, *Buxton* Water being warm, highly impregnated with a mineral Steam, Vapour or Spirit, containing a most subtle and impalpable Sulphur, and being the product of Limestone; it is therefore rarefying, heating, relaxing, thinning, sweetening, and a little drying, hence it is signally beneficial, and surprizingly successful in the Gout, Rheumatism, scorbutic and arthritic Pains, wandering or fixt Pains inveterate or recent; Cramps, Convulsions, dry Asthma's without a Fever or quick Pulse, bilious Cholick, want of Appetite and Indigestion from Intemperance, hard drinking, &c. Contractions, Stiffness and Lameness therefrom in any Part, Barrenness from a Constriction and indilatibility of the *Fallopian* Tubes and *Uterus*; Painfulness, Want, or other Irregularities of the *Menses* from the same Cause. In all stoppages and beginning of Obstructions and Stiffness of the Vessels tending to a Concretion and Expulsion of the Fluids; or where external Tumours compress the small Vessels, or where there is an over growth or too great Strength of the Vessels resisting the Fluids. In *St. Anthony's* Fire.

Fire, Tetters, Ring-Worms, Scab, Itch, and Morpew, it is also useful in the beginning of the Swellings on the Bones or *Perioſteum* which are ſoft, yielding to the Touch, or of the conſiſtence of ſoft Wax, called *Gummie*, and *Tophi*, and in Nodes &c. and in chalky Tumours in any Part of the Body inward or outward. In all hard callous Swellings it eaſes Pain and ſoftens much, in old Strains, or Pains afflicting the Perſon upon change of Weather, whether they be originally from broken or diſjointed Bones, diſtorting of the Parts, or pulling them out of their natural Poſition: In any withering or pineing of the Parts: In want of Perſpiration from Cold, without a Fever or load of Humours: For Heat, Stoppage and dribbling of Urine: In too great a Contraction of the urinary Paſſages and Strainers; for ſcouring off Sand, Sludge, and Gravel out of the Kidneys: In Hiccup and Vomiting from a ſaline Matter, ſtimulating and contracting the Stomach or Midriff: In a Dyſentery from Salt Humours raiſing violent Gripes and Convulſive Pains. That I enter not into a long detail of the Cauſes of thoſe Diſtempers and their differences, I deſire to be excuſed, being under Engagement to the contrary to my Encouragers, and ſtraited of Time and Room; the Experiments and Corollaries therefrom do fully explain them to the judicious, and to others it would answer no Deſign. I might here ſubjoin ſeveral ſecondary Uſes of this Water, but the common Vehicle being the only Phyſick in them, I ſhall refer my Readers to what I have ſaid on Water in my *Diſcourſe on Tea*, and in the Introduction to this Work. In the above Caſes I ſhould adviſe both drinking and bathing, but by no Means the laſt in a fit of the Gout, inward Inflammations, Fevers, Dyſentery, large inward Tumours, vomiting or purging of Blood, or wherever an outward Preſſure of the Body may do Miſchief.

As to the Age, Sex and Conſtitution of the Patient, in a Word the particular lightneſs and purity of thoſe Waters, entitle their Uſe ſafe and ſucceſsfully without ſcruple to all Ages and Sexes, Children, Youth, Men, Women, with or not with Child, except in the Firſt or laſt Months no Caution or Difference here to be regarded, only I would not adviſe young Perſons very full of Blood and Juices which run with a rapid Courſe in their Veſſels to be too free with them from the twenty third Year of their Life till after the thirtieth. Bilious or cholerick Conſtitutions, phlegmatic and melancholic may uſe them at Diſcretion, with Prudence, but the ſanguine muſt be a little more upon the Watch, for ſince they rarefy the Blood, and encreaſe both its Bulk and Motion, as well as add ſomewhat to its Quantity by Bathing: So their Veſſels being pretty well filled already, as of-
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ten appears from their low brisk Pulse and florid Countenance, here the Waters may distend the Vessels more, drive the Blood forward till it cause Obstructions, Stagnation, Inflammations, Fevers or a discharge of Blood by some Evacuation from a Rupture of the stretched and weakened Vessels. Neither should I be fond of advising flegmatic gross Bodies after the Meridian of Life to continue it long, except for a few Days bathing, to open the Pores of the Skin, thin the fizy Humours in the small Vessels there, and discharge a Part of them, and so fit them for a colder Bath of greater Pressure and *Stimulus*; not that I am fond of cold bathing in old Age when the Spring of their Fibres is almost worn out, but I mean between the Meridian of Life and old Age. As to the Season of the Year for using these Waters, after such a strict examination and Investigation of their Parts, excuse me if I differ from the common Opinion, and prefer early in the Spring and late in the Autumn: For consider we first the Luxury of the Age in eating and drinking; simple plain Food that was the delicate Dish of our long lived healthy Ancestors, will no longer down, our Meat must be higher seasoned, we cannot dine but upon several Dishes; weak plain Potables will no longer down, we must have at least Wine, or which is worse (as it is more viscid) strong Ale, or perhaps Brandy and Water; do not all these heat and inflame the Body? Secondly, does not the Water of itself rarefy the Blood, and relax its Vessels? and Thirdly are not the Juices of the Body more rarefied? take they not up more Bulk, and are not the Vessels more relaxed in Summer than Winter? is this then a fit Season to send Youth, plethoric and sanguine People to those Waters? either they must use them for some time, or not, if the last, why came they to them? what design will a mere complimenting Visit of the Waters, and perhaps tasting of them, or going into them, answer? sure no valuable End. If they use them for any considerable Time, are they not exposed to the mercy of Inflammations, Faintness, Palpitations, Fevers especially hectic, &c? And will not the Waters answer the same Intention, with much greater safety, from the latter end of *March* to the middle of *May*, and from the first of *September* to the first of *November*? It is true, the coldness of the Place may be objected; but is there not a good House, dry, warm Rooms, and plenty of Coal, and rarely without some Company; and a pleasant, dry Country; where then is the harm, even in the middle of Winter, upon urgent and necessary Occasions? are not the Waters considerably warmer? does not their Efficacy chiefly depend upon its warmth and what causes it; and the warmer they are, are they not the more virtuous and successful? nor is the Blood so apt to be rarefied, seeing the Air in the
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Blood must be in *æquilibrio* with the external Air. This is not Speculation, I mention it from Experience, having ordered Patients there in *March* in great Frost and Snow, and never observed better Success than the Water had upon them all.

As to the Method of using the Waters, except the Body be costive, and the first Passages furred up with gross Humours, I declare my self a profess'd Enemy to what is called preparing the Body for them, by strong purging, which often cause Pain in the Bowels, Windiness, Looseness and Dejection of the Appetite, the chief thing to be regarded and kept up in a Course of Mineral (especially Warm) Waters; therefore I content my self with simple plain Laxatives, which unload the Intestines without Sickness, Pain, Confinement or Prostration of Strength or Appetite, as Lenitive Electuary, Rhubarb, Manna, Cream of Tartar, &c. Or if the Stomach is loaded with Phlegm, palled and relaxed, to prevent this being sent down and carried off into the Body with the Water, and there doing a great deal more Mischief; I would give a gentle Vomit as of the Infusion of *Ipecacuana*, or that in Substance to strong Bodies, and neither drink nor bath for thirty Hours after at least. Young People full of Blood, or who have a meagre Body and quick Pulse, I would order to be blooded before they begin. Such as are liable to the Gout should neither be blooded nor vomited, except there were strong Indications to the contrary, but let them have *Tinctura Sacra*, or *Elixir Salutis* for a Purge. When they begin to drink the Waters, a Pint before Breakfast, and as much after is sufficient for the first two or three Days, then half a Pint more for two Days more, and at most three Pints in a Forenoon; for this Water not being an evacuant, but alterative, must not be thrown into the Body in large Quantities, whereby a great deal more hurt may be done than the good we expect: At best we thereby turn it to an evacuant by Urine, or receive certain Mischief. As to Diet, if it be seasonable, healthy, and temperate before, I would have no great Change to be made in it, from what was the Persons ordinary Way of Life before, only as the Water heats and rarefies, beware of Pepper, Mustard, Onions, Shallots, Horse radish, and all aromatic heating seasoning; and of all inflaming Liquors, Claret or White Wine and Water for drink are best; and when the Design is to relax, I would allow Fish, but no salt Meats, especially those dried in the Smoak, nor Salt Fish, Goose nor Duck. Breakfast between eight and nine a Clock in the Morning, dine at one, sup at seven, let the Supper be light and easy of Digestion, go to bed at ten, rise at five or six in the Morning, go into the Bath, continue there from seven Minutes to half an Hour, according

according to Strength and the Case of the Patient; when you come out, if you go not to Bed to sweat (which is seldom used) dry the Body well and dress presently, and if the Weather is cold go to a warm Room, use gentle Exercise, walking about, and drink your Water. Fly ungovernable Passions, Moroseness, sitting up late, reveling and unseasonable Hours, shun violent Exercise and Intemperance, be cheerful; if the Body is costive, drink Tamarind Broth, or take a Glister. If the Stomach is weak, raw, and belching, take a little bitter aromatic Wine before you begin your Water drinking, and when you have drank ten or twelve Days, intermit for four or five Days. But as it would require some Folio Volumes to give particular Directions to all People of every Case, Constitution and Age, for the right and profitable Use of such a Number of different Waters, I hope these few general Rules will suffice, especially as all these Waters of greater Note are seldom without neighbouring Physicians who are capable to give better Rules upon the spot, than it is possible for me to give here. As a great deal of the Efficacy of those Waters depend upon good Rules well observed, so it ought to be every ones Care, who has any valuable End to answer by them, to have the best Advice. Let me add once for all, that as this Water is of such a Nature as I have mentioned, so it is not to be trifled with, for if it be unnecessarily used, it will certainly do Harm.

But it may with Justice be objected, if these Waters are bad for nothing, they are good for nothing; we shall therefore give not only its Advantages, but Disadvantages. Its Use therefore is unsafe and unadvisable, where there is too great an impulse of the Fluids into the lateral Vessels, as it relaxes the last, and makes more Way for the first and rarefies them: Nor is it to be meddled with in Tumours from an impulse of the Fluids, with a Dilatability of the Solids beyond all Recovery of their natural Tone, and in Swellings from an Extravasation of the Fluids, no more to be received into their proper Vessels, as in Ruptures of large Arteries and Veins, whereof only one Coat remains, or in Extravasation of Blood, *Serum* or *Lympha* into any of the Cavities of the Body, or Interstices of the Muscles or Membranes, nor is it safe in a natural fullness of Juices, and a Disposition of the Body to breed Blood quick. Nor is it advisable in any inward Inflammations as of Stomach, Liver, Lungs, Kidneys, or Pleura, or to drink it in large outward inflammations of the Glands, seeing it both increases the Blood's Motion and Quantity, and disposes it to run more impetuously upon those Parts whose Spring and Resistance is impaired or lost, nor is it to be

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indulged in inward Imposthumes. It is a Chip in Pottage in these Tumours called *Melicerus*, *Steatoma*, *Atheroma*, *Talpa*, &c. It is also mischievous in Consumptions attended with a rapid Motion of the Blood, and weak pulmonary Vessels; and in too copious Perspiration: Or in a Word, wherever strengthening and bracing up of the Solids, and thickening and cooling the Fluids is indicated, these Waters must be refrained, or where the animal Secretions are to be lessened.

Hence observe the following Mistakes in the Use of these Waters, *First*, Does their chief Efficacy consist in their volatile Parts, which only consist of a Steam or Vapour, and are they better adapted to Diseases of the smaller than of the larger Vessels? then it is an Error to imagine that all the Business is done by drinking large Quantities of them, and so turning them to Evacuants, at least powerful Diureticks; whereby they are hurried out of the Body before they have done their Work, which lies in much smaller Vessels and requires longer Retention. *Secondly*, Is Evacuation inconsistent with all the Intentions of the Waters? then how imprudent are those who use evacuant Medicines along with the Waters, whether purgatives or diureticks, which expeditiously carry off the Waters, and together with them the thinner Parts of the Blood out of the larger Vessels, and the *Lympha* which is poured into the *Chylopeia* for thinning the Chyle: But allow they should drink so much more Water in proportion to the encrease of the Drains, is this mending the Matter and not making it worse, for hereby there is a greater pressure and quantity of Water laid upon the Intestines or *Uropeia*, the Fluids in these Glands thinned and their excretory Ducts widened and laid more open, and all every way fitted for a larger and freer Vent of the more serous Parts of the Blood, which should thin the grosser in the smallest Vessels: Hence Obstructions are more riveted there, or at best not mended. *Thirdly*, Does the Water heat and rarefy the Blood? is it then rational to send young People especially thither in the Heat of Summer, whose Blood is capable of Rarefaction, when the Warmth of the Water, the presence of its mineral Principle, joined to the Heat of the Blood, when the hot Season has relaxed the Solids and widened the Vessels, and the Blood in its greatest Natural Rarefaction? One would think this Caution needless, to such especially as consider the fatal Consequences of a very rarefied State of the Air by Lightning to animal Bodies; for the Atmosphere being suddenly rarefied by the Flash, the sudden Expansion of the Air in the Blood, to a Balance with this Atmosphere, quickly bursts the Vessels, mangles Solids and Fluids together as in a Mortification. And the hardest Parts
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which give the greatest Resistance to this violent Expansion, are burst into a thousand Pieces, the Spring of the Air being so much superior to the Cohesion of the Parts. *Fourthly*, Does the Water rarefy the Blood? then how inconsistent is violent Exercise with their Use, as dancing and reveling to unseasonable hours, strong Bowling in the heat of the Day, galloping on Horseback instead of an easy Trot or ambling Pace, &c. These violent Exercises heat the Blood too much, and are often of bad Consequences. *Fifthly*, Is the Design of this Water Relaxation and Dilution? then how do such promote those Ends, who deal all the while in Drams, Spirits and Punch, all which contract and shrivel up the Solids, as the first two very remarkably coagulate the Fluids. *Sixthly*, Do the Waters rarefy the Blood, and encrease its Bulk and Motion, and is it safe and advisable for those who have a natural fullness or overflow of this Juice, whether as to the Vessels or Humours, or to such as have naturally a quick Pulse, large Secretions, thin Bodies, and weak Vessels? I am sorry I am put upon using Tautologies in this Manner, but neither the good nor bad Effects of this Water having been before shown from true and solid Principles or demonstrative Arguments, as its Usefulness and Nature requires, I cannot be too much upon my Guard nor give too much Caution, especially in an Age when plain Truth in an easy Dress prevails so little against Taste, Custom, and depraved Inclination; for, once more give me leave to say, these Waters are not to be trifled with, for if their Use is not wanted, and does no good, they certainly do Mischief, and whoever says the contrary, votes these Waters good for little or nothing, and if they understand the Waters right, may as well advise the *Peruvian Bark* in continual Fevers, or during the Fit of Intermittents, or Steel Medicines in a *Plethora*, or Sugar of Lead in a Dropsy or Palsy, or Camphire in the Declination of a hot Fever, which has parched up and dried the Body, and almost worn out the Spring of the Vessels. But *Seventhly*, Are these Waters warm and impregnated with a very volatile penetrating Part, wherein lies their chiefest Efficacy, and is this Principle gone when they are cold? then they must be drank warm at the Spring to answer any End; for when they are cold they only serve instead of common Water, being purer and better than that. *Eighthly*, Is the Nature of these Waters relaxing and thinning? then special care must be taken, that a suitable diet both in meat and drink be strictly observed, and that the Patient refrain every thing that's opposite to their Use, and gave Birth to his Distemper, tho' never so much his favourite, and seemingly opposite to Nature. *Ninthly*, Is the chief

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design of these Waters Relaxation and Dilution? then are they improper in Obstructions from a Siziness of the Juices and a Relaxation of the Vessels, as in Cachexies, Dropsies, &c. *Tenthly*, But say some prejudiced Persons, if you can find out the Nature of this mineral Spirit, in which you assert the Efficacy of these Waters to consist, why may they not be imitated, and so People saved much Labour and Loss of Time and Expences, as well as bring Profit to your self? Answer, 1st imitate it with what? Whether with fixt or volatile Bodies? Where will you furnish me with Matter divided into and existing in such small subtle, incoercible Particles? Or where is the Art that can reduce mineral Substances to such a volatile fugitive mineral Spirit, a Spirit that cannot be retained? a Substance of almost as minute Parts, as those of Light and Heat, a Steam fitted to pass the smallest Crannies in Nature. But 2^{ly}, so exquisite is the Mixture and so great the difference between divine and humane Compositions, that the first is inimitable. What Anatomist that knows the Structure of a human Body the best, will undertake to make another like it? Or what Chymist that can separate the Principles of a Plant to the greatest Exactness, will yet have Assurance to boast of his Capacity so far as to reunite even the same Parts again in the same Form and Condition, with a vegetable Life? even so different are the Compositions of God and Man. Hence we see that he which made these Bodies and Vessels at first, is best judge of their Diameter, and knows best how to prepare Substances suited to their Dimensions and Diseases; therefore could we pretend to mimick these Waters, yet the counterfeit would be as much inferior to the Natural, as a Piece of Painting tho' never so fine, is to the original Life.

Of MATLOCK, and the other Waters in Derbyshire.

FROM *Buxton*, go we thirteen or fourteen Miles upon a most easy open Road, Southward to *Matlock* Bath, which is a Mile from *Cromford* Bridge, as far from *Matlock* Bridge, ten Miles from *Derby*, seventeen from *Nottingham*, sixteen from *Sheffield*, eight from *Chesterfield*, seven from *Bakewell*, and three from *Wircksworth*: It is a few Minutes beyond the 53^d Degree of North Latitude, situate upon the East Side of a high Hill, at the Foot whereof flows the River *Derwent*, whose Waters are very clear and sweet; its purling Noise is echo'd back by prodigious Rocks and Mountains on all Sides; it is well stocked with Trout, Grillin, &c. From a little beyond the Bath-house Stables, this River runs almost North and South, till it reach *Cromford*; and a short Mile on the East Side facing the Bath, runs a beautiful range of Limestone Rocks, with a pleasant Mixture of white Chertstone. In that Place directly opposite to the Bath, its Perpendicular above the *Derwent* is eighty Yards; little more than a Quarter of a Mile North on the same East Side, is *Matlock* high Torr, whose Altitude is a hundred and forty Yards. Beyond this range of Rocks are pleasant Meadows and Pastures, fruitful Corn Fields, and a charming Grove of Wood, above which rises *Rybur* Hill, which defends these Fields from both eastern and northern Blafts. These wonderful Precipices opposite to the Bath are charmingly beautified with rows of Oak, Elder, Ash, Maples, Yew, Ivy, &c. one above another, as though they had been regularly planted. The Height of the Bath above the *Derwent* is sixty one Feet, and from it to the top of the Rocks behind, and on the West Side of the House, is one hundred and twenty Yards perpendicular, where stand several small Cottages, on a Level with *Matlock* high Torr, viz. one hundred and forty Yards. From these Cottages run several small Grass Closes on another Ascent, which anon becomes very steep and rugged, and rises almost to a Level with the top of *Masson*, whose Summit is two hundred and fifty Yards above the *Derwent*. On the North and North-west Side of the Bath rise

Westup's

Westup's towring Hills twenty Yards above the high Torr, on the lower and south part of which is a small Grove, with dry Meadows, fruitful Pastures, Houses, Mines, &c. above these is a rugged steep Ascent, on the top of which *Proud Masson* raises his lofty Head. On the West Side of the Bath, is another steep and almost inaccessible Ascent of prodigious Craggs and Rocks, lying on heaps like the Ruins of some frightful Mountain tumbled down, above which are some Houses and Inclosures, and then another Hill heaped like *Pelion* upon *Ossa*, at the top of which is a dry delicious Plain commanding a very large Prospect, except on the North Side, where it is bounded by *Masson*. From this delightful Plain which commands some parts of *Staffordshire* and *Cheshire*, the sight is entertained with several Towns, Villages, Churches, and Gentlemens Seats, some sinking into and others rising out of Ruin, with a great Variety of hideous Rocks, craggy Mountains, pleasant Groves, and fertile Vales, beautifully intermingled, which at once surprize and please the wandring Eye. Here you breath a pure, thin, and fragrant Air, which in the summer Season is impregnated with the grateful Odour of a thousand Herbs, Plants, and Flowers, which cloath and beautify the Hills and Mountains; and while the feather'd Tribe from the neighbouring Trees and Grotto's are freely contributing their melodious Notes to your Entertainment, you may hear your eviscerated Mother Earth groaning under the rude treatment of her Sons, who, with various cruel Instruments, are tearing out her very Bowels.

On the South and West Side of the Bath, is a continuation of the same ridge of Mountains, beautified here and there with Treesⁱ.

All the warm Waters spring up from between fifteen and thirty Yards above the Level of the River; for either higher or lower the Springs are cold, and only common Water, so that the materials warming and impregnating these Waters lie in that Height. From the most Northerly to the most Southerly of these warm Springs is about five hundred and seventy Yards. They lie in the following Order, from the warm Spring behind the Stable to the Bath, is about one hundred and eight Yards, from the Bath to the first of the warm Well Springs, about four hundred Yards South; from that to the Second six Yards, from this to the Third, sixty four Yards South East; from the Second to another warm Spring, South West, or rather West, in the next Close but

ⁱ The Charms and surprizing Beauties of this Place have been attempted by several Hands, I shall here present my Reader with the two following Essays of this kind.

but one to the Road, about twenty Yards; and twenty Yards North, at the back of the Kitchen, is another warm Spring which supplies the House with Water. All these Fountains, except the last, throw forth such Quantities of Water, that their exact Commensuration, required a great deal more Time and Expence than my Business would permit, or the Proprietor of the Place deserved, not having given the least imaginable Assistance to this Design. Besides the beforementioned, there are small Rills or Springs within the aforesaid Space. And on the South side of the Hill, about half a Mile South West, there is a prodigious quantity of warm Water thrown out of the old Lead Works, which go under the Name Balls-Eye^k. These Rocks and Mountains are beautifully

HAIL, awful *Matlock*, Nature's chiefest
Pride,
What to all other Places is deny'd,
Thou, thou alone enjoyest. Thou keep'st
the Form
Which Nature gave thee, nor can Art
transform,
Or change thy Beauties which to thee she
gave :
When by divine Command, first from the
Grave
Of Nothing rose this Earth. In vain shall
Art,
Attempt such pleasing Beauties to impart
To our astonish'd Eyes: In vain the Skill
Of Painters, or the Poets forming Quill.
Thy Hills in Horror beautiful arise,
And seem to touch the Summit of the Skies;
Thy clear and purling Waves through
Valleys flow,
The winding Mazes intricate below.
Thy Greens in various Shades delight the
Eye,
Intender Shrubs, or Trees aspiring high.
Silent I stood, and silent I admired,
From Company, nay from my self retired,
&c.

ON whose sweet Southern Banks fair
Matlock stands,
At once the Valley and the Cliff commands.
Close to its Verge, the sleepy Alder
grows,
Nods o'er the Current, that loquacious
flows.

The Pale leaf'd Ash, as if she'd got the
Spleen,
Adds Beauty to the Oak's deep tinctur'd
Green.
The gilded Mapple courts the am'rous
Sun,
Reflects his Glory to the sharp horn'd
Moon.
The hardy Holly taunts the sturdy Yew,
That from the jetting Rocks project to
View ;
Profusely there in fair progression rise,
And animate the Steep with wild Surprise.
The jetting Rocks proud Castles seem in
Air,
That bold Defiance to Invaders dare.
O'er these, a-top, the *Linden* waves his
Head,
Chaplets the Summit, and o'er-looks the
Mead, &c.

^k But tho' all those curious natural Beauties conspire to charm the outward Senses of Strangers, and render the Place the pride of Nature, and put to the Blush the most refined Art and Artist, yet are all these (except the warm Waters) the smallest and most inconsiderable part of its Excellency ; for the Bowels of its Earth afford far greater Riches than the Surface of the fruitfullest Soil can produce; for all these Mountains and prodigious Rocks are only so many Repositories for those Minerals which they contain; the richest part whereof yet discovered was *Balls-Eye*,

beautifully and richly cloathed with Harts-Tongue, wild Sage, Marjoram, Thyme, Maidenhair, several sorts of Geranium, &c. All along this Course of warm Waters, from their first Eruption down to the River, are the greatest Heaps, and most surprizingly large Petrefactions of any Place in *Britain*; they are so soft, before they are exposed to the

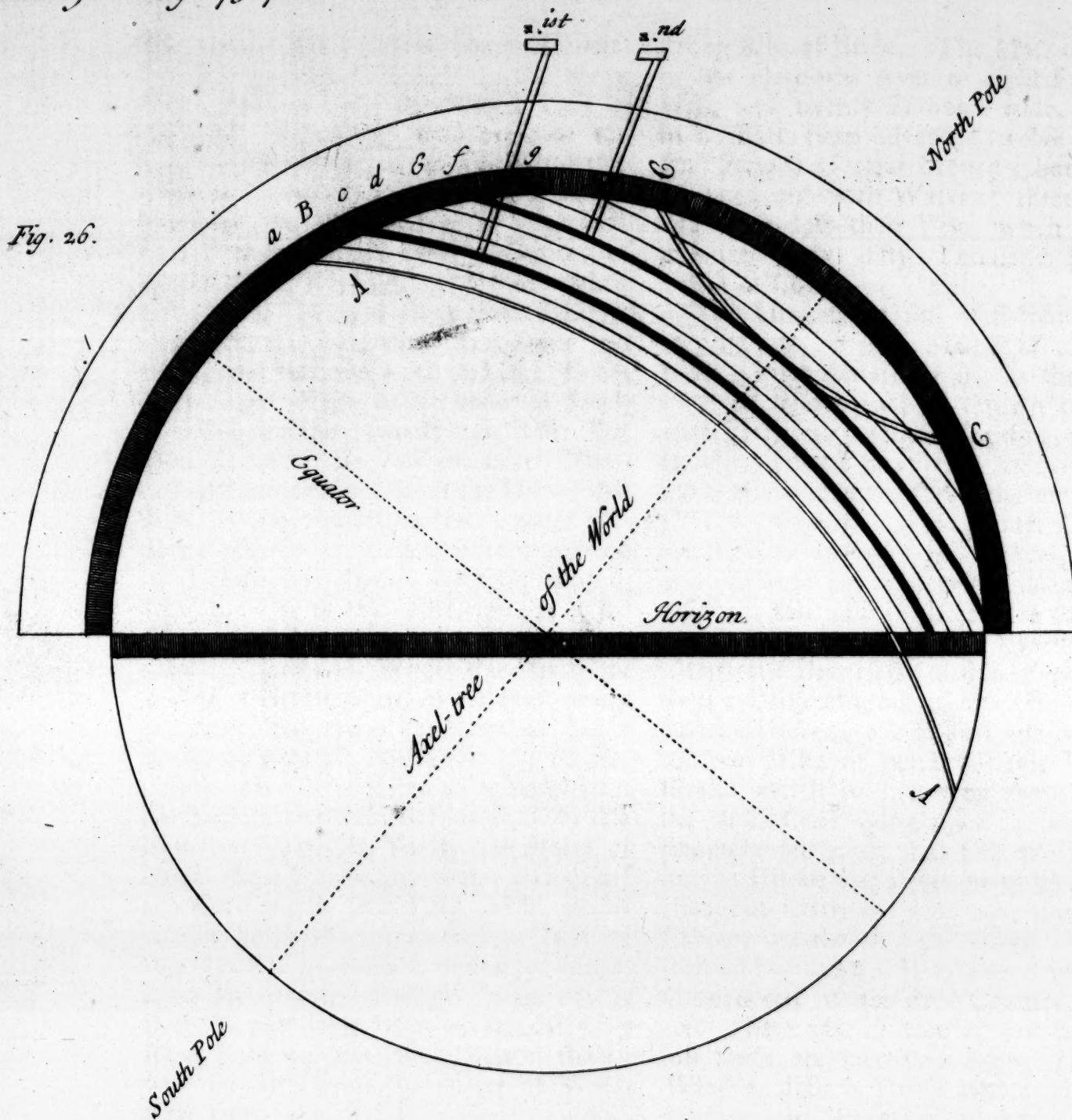
Eye, which was a natural Grotto formerly filled with Ore, even so high, that above *Bonsal Brook* it reached within a Yard of the *Day*. This Ore, tho' none of the beautifullest (being of a blackish dusky Colour) yet was the richest in the Neighbourhood, for each Fudder of it on refining afforded about twenty Ounces of good Silver. Nine Dishes of well-washed and cleaned Ore generally goes to a Load, each Dish weighing about four Stone and a half, and between seven and eight Loads afford eight Piggs or a Fudder of Lead, each Pigg weighing twenty two Stone. But there is no certainty of the exact Quantity of Lead obtained from the Ore of different Mines, some Ore having more Sulphur, other less; it is also kept a Secret by the Lead Merchants, what Quantity of Lead the Ore of any Mine contains; for they buy the Ore of the Miners at as cheap a Rate as they can. Where the Mouth of *Balls-Eye* Grotto opens to the *Day*, it is a hundred Yards above the Level of *Bonsal Brook*, all which it loses in sloping or dipping down till it come to a Level with the Brook; the Shaft or Pipe sunk to this Level was Sixty-six Yards, the *Strata* of Earth digged through, were, 1. Turf and Corn Mould two Foot thick. 2. A reddish brick Clay from half a Yard to two Yards. 3. A loose or bastard Limestone six or seven Fathom Deep. 4. A blackish and some Beds of whitish Clay lying from ten to twelve Fathom thick; thus far all Drains or Springs of Water were cold, and very little Shale or Brasil. All along the Lead Vein ran a Current of warm Water, but all above, and on its Sides, were cold Springs. Along the Sides of this Level, and by the Sides of the Vein, at Twenty-six, Twenty-seven, and Twenty-eight Fathoms deep, laid several

strong Ribs of Brasil. The Mass of Lead in one Place was seven or eight Fathoms high, and twenty Fathoms wide, which in a short time advanced twelve Thousand Pounds of clear Money; but being drowned out with Water at three Years end, they lost their Vein, when it had produced above fifty Thousand Pounds worth of Lead.

This Ore was so full of Sulphur, that in Smelting, a blue Flame of a Hand breadth thick stood over it, as though a Piece of Brimstone was thrown into an open Fire, and a most suffocating Stench, enough to choak any living Animal. The more Silver is in the Ore, the more Sulphur it contains, and the greater Dangers are the Smelters in of the Belland, which is a Disease attended with violent Convulsions, shortness of Breath, a pale yellowish Complexion, loss of Appetite, dry Cough and Hoarseness; first a Feebleness, then a Palsy and loss of the Use of the Parts. Horses break Pasture and run four or five Miles in quest of this Belland Grass, which is exceeding sweet (from the small Lead lying upon it) and surprizingly fattening, but kills effectually; for the Horses can never be quite cured; change of Grass and Air, with much hard Labour, are the only Palliatives. Several such fat and diseased Horses are sent by the Owners out of the *Peak* Country, to be sold where that Disease is not known; but these are its certain Signs, 1. Short Winded, like a Horse whose Wind is cracked. 2. They heave and lift much at the Flank. 3. They groan very sore on the least Exercise. 4. When far gone and near dying, they fall into Convulsions. The People of this Country seldom rear any Puppies as far as the Smoak or Water of these Smelting Milns reach. A Gentleman



Plate for Page 75. 76.



the open Air, that you may easily crumble them to Pieces with your Fingers, and are very light, but afterwards they turn of a smoaky blue Colour, become very hard, and are more durable than several sorts of Stone, so that the Neighbouring People top their Chimneys, make Fences, and build Vaults or Arches with them, at very little Charge. Any

tleman had a Hen died of the Belland, a tame Fox eat her, fell into terrible Convulsions, and died the third Day after. But of all other Creatures, Cats are the soonest infected with this Disease. Chickens and all sorts of tame Fowls catch it, but when they begin to be lazy, the Owners open the Stomach, cut the Craw, take out much Lead, wash the part, put a little Butter in it, sew it up again, and many of them recover. The more Silver is in Lead Ore, it rings, but that which has little Silver, rings not.

Give me Leave to this to subjoin a part of two Letters from Mr. *Anthony Tiffington*, near *Matlock-Bridge*. He, and He only is the most ingenious of all those I have met with about these Mines, and gives the best Account of the Minerals and Fossils of that Country. The first is of

May 13, 1732.

“WE have three sorts of Lead Ore common in this Country, viz. Dice Ore, Steel Ore, and Firm Ore; the first contains as much Lead as any, and is generally lookt on as the finest, if a Piece of it is broke, it still falls in to lesser Dices similar to the first; from which Figure it has its Name; it is also called Potters Ore, because with it they glaze their Pots. Steel Ore, has its Name either from its blackish Colour, or from its Hardness, for when broken, it resembles Steel, and is thought to be barren of Silver; however it is rich in Lead, and contains near as much as the first. Firm Ore, or soft Ore, is almost of the Colour of Lead itself, but much softer than either of the former, insomuch that when the Workmen bruise it with their Hammers, it spreads like a piece of Clay; this

sort often contains great Store of Lead. There is also a Lead Ore, that lies like small Marcasites in Spar, Cauk or grayish Stones, in small Grains; this is very bright, but it is still one of those three sorts; for these comprehend all kinds of Lead here.

Spar we have in Plenty, and that of four sorts, 1. Glass Spar, it is of a whitish Colour, very transparent, and so polishd, that it will answer the Design of a Mirror. 2. Yellow Spar, which is not so common as the other, often being joined with other Minerals; it is sometimes transparent, but there are several sorts of it. 3. White Spar, it is very brittle. There are sundry kinds of this, as Sugar Spar, &c. 4. Blackish Spar, it is very transparent, and all its Parts are Rhomboids, and we often find all four in heaps; there are many other Sorts, but these are the chief simple Spars.

Our Limestone Rocks abound with Substances like a Nucleus or Kernel, some like Cockle or Oyfter Shells, others like Screws, some like Strings of Beads, &c. Specimens of those, as also of the sundry Sorts of Ore and Spars I have sent you. I am Sir, &c.

Anthony Tiffington.

The Second Letter.

Feb. 23. 1732-3.

“A Draught of the North Hemisphere (vid. Fig. 26.) The great *A* shews the double Line, signifying the Tropic of Cancer. Great *C* the Artick Circle, betwixt which lyeth our Country Mines. The great *B* and *E* shew the two black Lines which represent two Veins, or the striking Passages of Lead Ore.

O

“The

Any strong Acid dropt upon them, raises a great Fermentation, hissing and bubbling up with a sulphureous Smell and Smoak, and turns them to a Jelly. The Country People call these Petrefactions Marle; several have informed me, that pieces of them laid in common Water, coalesce in time, and if so, they might answer the same design of rotten-stone, which is brought from abroad, and sold at four Pound *per* Ton.

“ The small Letters, *a, c, d, f* and *g*,
 “ show the small Lines representing the
 “ Beds of Stone, which I suppose lie
 “ Horizontal to the Pole, as in the Fi-
 “ gure.

“ There are various kinds of Stone, *viz.*
 “ Whitestone or Limestone, Blackstone,
 “ Dunstone, Brownstone, Chertstone,
 “ &c. but the Course of their Lines is
 “ uncertain, for the same Stone keeps not
 “ an exact regular Course in all places,
 “ therefore nothing particular can be said
 “ of it, I speak only in the general as to
 “ the Scheme, in which case it will hold
 “ good.

“ Now as to one particular Bed of Stone
 “ it is not always alike, for in some Places
 “ its harder, in others softer, in some hea-
 “ vier, in others lighter, some more
 “ porous than other, but the black Stone is
 “ the most porous. According to our
 “ Observation, the deeper any kind of
 “ Stone lies under the Earths Surface, the
 “ greater is its Gravity.

Demonstration.

“ The shaded Semicircle represents the
 “ Earths Surface, unto which the Veins of
 “ Lead Ore are cast up by the Beds of
 “ Stone, and in these Places we discover
 “ our Mines. Then beginning at *B*, we
 “ cut what we call a Drift along the black
 “ Line, till we are stopt for want of Air,
 “ then we sink a Shaft at *Z* first, which
 “ cuts through the Beds of Stone, and
 “ and falls into the Vein; up this Shaft
 “ we draw our Ore, Earth, or Stone, it
 “ also supplies us with fresh Wind; from
 “ thence cutting still forward in the black
 “ Line *B*, we are got so far on, as to want
 “ fresh Air again, then we sink another

“ Shaft at *Z* second, in the sinking of
 “ which we discover another Vein, which
 “ runs directly over the other, till cast
 “ out by the Stone; this we call an up-
 “ per Level to the former, since a
 “ perpendicular Line or Shaft let fall from
 “ *Z* second, cuts both.

“ Thus (Sir) I might describe more,
 “ but these are sufficient, in that it is
 “ mostly impossible to have three Veins at
 “ once, for before the third is found, the
 “ first is got under Water, otherwise it is
 “ probable they succeed one another in the
 “ same Order.

“ There are some few Veins which
 “ range East and West, but not so many
 “ or considerable as to destroy the former
 “ general Hypothesis.

“ From hence it is evident, that were
 “ there a Passage through the Earth in a
 “ perpendicular Line, or along its *Axis*, we
 “ might discover innumerable Veins, cut-
 “ ting us at right Angles, for they gene-
 “ rally lie in the same Order. But as
 “ Greetstone, Shale, &c. breed or lodge
 “ not Ores like the other Stones (they
 “ keeping their Course like the other
 “ Stones) therefore it is that some Coun-
 “ tries where they are cast up to the Sur-
 “ face bear not Minerals like ours.

“ Sir, I hope you will not look on the
 “ preceeding Lines and Schemes as tho’
 “ they came from a Person who was Ma-
 “ ster of what he only aims at; but
 “ consider them as the Production of an
 “ illiterate Pen, tho’ truly agreeable to
 “ Truth, and intirely founded upon, and
 “ agreeable with Observation and Expe-
 “ rience in this Country.

Sir, your humble Servant,
Anthony Tiffington.

All the warm Waters which exceed from the Roof or Arches of sundry small Grottoes hereabout form little Pillars or Prisms of various different Shapes and Figures, such as Bones of all sorts, Hartshorns, Corals, and some faint representations of several parts of Animals; but the warm Waters above ground form another sort of Petrefactions, viz. by incrustation at first; but afterwards it totally consumes or destroys the Body on which it gather'd, and assumes and retains its genuine perfect Shape, as Mosses of several kinds, Grass, Leaves, Sticks, &c. These, without all peradventure, are the finest Petrefactions I ever met with, nor are there any more of them in *Derbyshire*, except near *Winstanley*, and at *Alport* in the Duke of *Rutland's* Liberty.

As to the Healthfulness of this Place, if the moderate quickness of a Stream, its plentiful Impregnation, with primogeneal Salts and Sulphur, if freedom from Stagnations, vapid and stinking Exhalations of standing Pools, Marches, or boggy Grounds, can promise good Water, here we have it in Perfection in the *Derwent*, and in many fine Springs on both Sides of it; and if the clearness, sweetness, lightness, continual motion and purity of Water, tend to promote Health and prolong Life, here we may reasonably expect to find these valuable Blessings. For if plenty and goodness of Fish be any Indication of good and wholesome Water, it is here at *Matlock*; if exemption from Fens, Marshes, Lakes, Ditches, or pestiferous Steams and Vapours, if the clearness and purity of the Air, if a dry Situation, screen'd from the baleful chilling Blasts of North East, and West Winds, and fully exposed to the Sun the whole Year round, the Atmosphere being perfumed with the fine odoriferous *Effluvia* of fragrant and salutary Plants, if all these together are capable of rendring any Place delightful and healthy, we may then pronounce *Matlock* to be so.

But to return to the warm Medicinal Waters, as we are sure that some of them come from a Shaft called the Cobar, (which is directly above the warm Well Springs, and hath one very plentiful warm in it, which finding a Passage through the Chinks and Crannies of the Rock, empties into the warm Springs below, and saves the Miners the trouble of a Level) we shall therefore be very particular in examining their Earths and Minerals. On a diligent Disquisition of them, I found Turf and Corn Mold first, then some Toad-stone, so shallow in the Earth, that in some Places it lies exposed to the Day, where by the Air it becomes more light, soft, and porous, full of little Holes like Birds Eyes, and then it is called Toad-stone, but before Black-stone, after this white Lime-stone, with black and white Cher-stone, which is a hard pellucid Substance, and truly a bastard Flint. There is in other

Places a green Cher-stone, then Cauk and Lime-stone; of the first are two Sorts, red and white, it is a solid ponderous Mineral, but not so very hard before it be exposed to the Air; the red is the more ponderous; next, is a mixture of white and black Croil-stone encompassed with, and closely adhering to Lime-stone; here the Waters begin to be tepid: then I came to great store of black Croil, Spar, Lime-stone and Ore, with some little Cauk, and by and by to a strong thick Bed of black Croil, set about with Spar, and mixt with Ore in the Bowels of the Limestone. Here the Water rises up with an impetuous Force, and at its full Warmth, forty Fathoms deep. This Water raised the Spirit in the Thermometer (the Diameter of whose Bore was one twenty seventh part of an Inch) six Inches, and six eighths above the common Water, or *Derwent* River. I went twenty five Yards lower down, where was another Spring which raised the Spirit only five Inches and a half above the *Derwent*; after this Experiment, I went down to the Water in *Balls-Eye* which is a little lower, where the Spirit in the Thermometer was five Inches and one fourth, so that I found I was past the greatest Warmth of the Water, for there the Water is warmest, where the black Croil is thickest in the black or blue Lime-stone. In the Substance of these Bodies run several small Veins of Minerals, of a reddish, brownish, whitish and dusky Colour, which being heated by the Workmens Iron Wedges driven into them, emitted a sulphureous Substance, which frying out like Grease smell'd intolerably strong of Sulphur. I brought some of each of these Minerals home with me, tyed up fresh in Bladders, to examine them at more leisure. Here I had the Pleasure to see some subterranean Petrefactions in their three-fold State, some beginning like the Cream of new Milk, others formed, but so soft and brittle they scarce would bear the touch; a few Drops of Oil mixt with this, makes a strong durable white Paint, which is indefaceable while the Surface of the Wood endures; and others hard and firm and finish'd Petrefactions. I found also in some Places, that had not been lately wrought, or trod upon, several Excrescences like a greenish white crystalized Salt, which dissolved to Water with the least Heat, though hard and crisp when taken up: of this I gathered a large Quantity, but had lost it all to four Scruples before I got from the Mine to the Bath-house, which I infused all Night in Water; what remained weighed eight Grains less; then I laid it on a red hot Iron in the Dark, it crackled much, smoakt and burnt blue, and weighing it again; it had lost ten Grains more.

Inorder to discover the true Ingredients of these Minerals, I poudered five Ounces of the black Lime-stone, put it in some common Water,
and

and took a common Thermometer which stood at twenty above temperate, setting it in Pipe Water, the Spirit fell to ten below temperate, then I set it in an infusion of powdered unburnt Limestone, but the Spirit continued at the same Height, nor was it alter'd by removing it into an Infusion of powdered Croil-stone. Mixing the two Infusions, I set the Thermometer in them; here the Spirits presently rose up to five below temperate. I then prepared an Infusion of powdered Cauk-stone, and of black Croil-stone in Water; when both had stood all Night, I pour'd off what was clear, and filtred them, the Tincture of Nephritic Wood turned both to a deep Green; Tincture of Rhubarb to a deep Yellow, Spirit of Hartshorn to a whitish Colour, Syrup of Cloves to a dark blueish Clear with a greenish Cast, Syrup of Violets to a Green. The only difference between them was, that Syrup of Violets turned the Infusion of Croil-stone to a deeper Green than the other, and Tincture of Logwood gave a deeper Colour to the first; the latter was much whiter, and let fall more Sediment with a Solution of Sugar of Lead, Oil of Tartar, and Spirit of Hartshorn. Then I tried a filtred Infusion of both these Stones burnt in the Fire. Solution of Silver turned the Infusion of the Cauk-stone to a whitish Clear, and the Infusion of the Croil-stone to a blueish Clear; Tincture of Nephritic Wood changed the first White, the other to a deep Green; Tincture of Rhubarb turned the first a muddy Yellow, the last to a beautiful Red; with Oil of Tartar, the first was a brownish White, the last clear with a white Sediment; the first was blackish, with Syrup of Cloves, the last Greenish; with Syrup of Violets, the first was a greenish Blue, the last a deep Green. With Tincture of Logwood, the first was a reddish Brown, the other a deep Scarlet red; With Tincture of Galls, the first was a muddy Clay Colour, but became greenish in two Days, the last a deep Green in eighteen Hours. I made the same Trial with Cher-stone, but found no Signs of any Salts, Iron, or Copper, only Syrup of Cloves turned its Infusion of a darkish Green; and Violets, of a green Colour. Toad-stone and Black-stone gave no suspicion of Iron, but Oil of Tartar, and Spirit of Hartshorn, turned both Infusions White and Cloudy; Syrup of Cloves made both of a deep Oak-leaf Green; Syrup of Violets changed both greenish, but it quickly faded: both were instantly Green with the Tinctures of Galls and Sumach, and very Red with Tincture of Logwood. Lastly, I made these saline Efflorescences, and beginning Petrefactions, pass through the like Infusion, Filtration, and Trial. The first with Solution of Silver was clear, the last a light purple Colour; the first with Tincture of Verdegrease was clear with an orange Sediment, the last clear with

a

a blue Sediment; the Tincture of Nephritick Wood turned the first Green with Sediment, the last Green without Sediment; the first with Tincture of Rhubarb was of a dark Yellow with Sediment, the last a transparent deep Yellow, with Solution of Sugar of Lead, the first had a light-brown Sediment, and with Solution of Sublimate, the Liquor was clear, and had a variegated Pellicle, with an orange coloured Sediment, the last, with Sugar of Lead, was clear, with a white Sediment, and with Sublimate, a dark clear, without Sediment; the Oil of Tartar threw down a brown Sediment in both; the first with Syrup of Cloves was blueish, the last clear; Tincture of Logwood turned the first to a dark Brown, the last to a deep reddish Brown; Tincture of Galls changed the first to a light Green full of Clouds, the last to a very deep Green, with much Sediment; and both were Green with the Tincture of Sumach. Croil-stone is of various Colours, black, blue, white and green; but the bluest of it put into the Fire, and burnt for half an hour, is white as Paper, very soft and sandy; though it is soft in the Earth, yet it hardens in the Air, and turns blue or purple: We only find it near the Warm-water Springs, where the black and green Spar are observ'd to eat out the Ore, tho' the white and sugar Spar are friendly *Strata* for it; for when the Miners meet with this, they think it a sure Sign that they are near the Ore. Among all these Fossils I could find but very little Brasil, tho' the Black-stone is often mixt with red and white Pieces, which afford Phenomena common to them both; upon great Friction or Attrition it is much heated, and becomes soft, porous, and brittle, by being expos'd to the Air, and yet it is full of Sulphur. The Dun-stone, as far as I could perceive, is a mixture of Clay and Lime-stone, not yet hardned, being soft when taken up, but turning very hard in the Air. Here I observed white, brown, and liver-coloured Cauk, which seems a coarser kind Spar, with a deal of Earth in it.

From the Examination of the Fossils, we shall proceed to that of the Waters, which were first taken Notice of about the Year 1698. When the Bath was built and paved by the Reverend Mr. *Fern* of *Matlock*, and Mr. *Heyward* of *Cromford*, and put into the Hands of *George Wragg*, who, to confirm his Claim and Title to it, took a Lease of it, of the several Lords of the Mannor, for ninety nine Years, paying them a Fine of one Hundred and fifty Pound, and the yearly Rent or Acknowledgment of Sixpence a-piece. He then built a few small Rooms adjoining to the Bath, which were but a poor Convenience for Strangers; but his Lease and Property being lately sold to Mr. *Smith* and Mr. *Penel* of *Nottingham*, for near a thousand Pound, they erected two large

commodious Buildings, with Stables, Coach-house, &c. made a Coach Road along the River Side from *Cromford*, and opened a better Horse Way from the *Bath* to *Matlock-Bridge*. Mr. *Pennel* having bought Mr. *Smith's* Part, and being now dead, the Right is invested in his only Daughter and her Husband ¹.

The Bath Water, and all these other tepid Springs, are exceeding clear, they have no Steam, except in a cold Morning, or winter Weather, nor do they throw up great Bubbles of Air, as the *Buxton* Waters; the Spring which supplies the Bath, comes in at the North West Corner, and falls down in a great Body, with a strong Current, and therefore has no Bubbles but what arise from the Air forcibly, carried down by the Water upon the Surface, where it falls; nor is there the least bubbling in any other of the warm Springs, they all glide down from the Hills above, and flow along in clear purling Streams.

The Weights I made use of in trying these Waters, were the same Hydrostatical Ballance as before; the Thermometer I had here was sixteen Inches long; the Bore of its Tube was one twenty third part of an Inch; the Spirits in it, in the hardest Frost, were as much hid within the Ball as would fill an Inch of the Tube, when the common Thermometers were thirty below Temperate; in a mild Frost, the common Thermometer being at twenty or twenty two below Temperate, this was two eighths of an Inch above the Ball, and in the hottest sultry Weather, the Spirits of this, in common Water, were two Inches and two eighths above the Ball. *September 17*, at eight in the Morning, the Air very thick and foggy till ten a Clock, a brisk South-west Wind, the Night before clear, with remarkable *Auroræ boreales*, the Spirits in this Thermometer stood at one Inch seven Eighths in the River *Derwent*, removed thence into the Bath, and standing there half an Hour, they rose to four Inches and two Eighths. This Water is

¹ Dr. *Medley* wrote a small Treatise on this Water in 1730. wherein he Discourses first on Water, then on the tactile Qualities; next gives a whole Transcript from Dr. *Wainwright* on the Effects of cold Bathing, which he would very artfully apply to *Matlock* tepid Bath, but with a wide Difference, every common Reader must be apprised, who considers the Effects of the cold Bath, and tepid Immersion; and lastly, concludes with some hearsay Stories which he had from *Wragg* the Landlord of the Place, and a particular Observation about a Man from whom, he says, was

taken a Hoghead of Blood. Then a few Reflections are added to several of his Observations, on the uncharitableness and injudiciousness of Physicians in general, who had tortur'd so many Patients both in Person and Pocket without any service till they came to *Matlock*. He pretends to account for the Effects of this Water from this one Reason, viz. That in all respects it is of the same Nature, and consists of the same Principle with *Bristol*, but if you expect any Proof hereof, mum for that, not one Voucher.

about a Penny-weight in a Pint lighter than common Water, and *Dervent* is lighter than most common Water, tho' I tried it in the Cool of the Morning.

The Bath Water new taken up, is curdled with Soap, and does not wash well, but standing two or three Days, it washes better than the best common Water; it incorporates and boils well with Milk, curdles a Solution of Silver, and lets fall a white Sediment on the Bottom and Sides of the Glass, makes it white below, and purplish above, and round the Sides. Solution of Sugar of Lead changed it milk white, then curdled and let fall a large Sediment; with Oil of Tartar it was pale and white, with Spirits of Hartshorn a pearl Colour; Spirits of Vitriol and Sulphur occasioned a strong Commotion, with much bubbling, left the Water exceeding clear, and the Sides of the Glass covered with Air bubbles; with Syrup of Violets, it first turned blueish, then greenish; with Syrup of Cloves, whitish; with Tincture of Logwood, a fine Red; with Tincture of Galls, a muddy Green Tea Colour; Red Roses and Oak Leaves caused no Alteration in it. *September 19*, I repeated the same Experiments by Candle-light, and let them stand ten Hours; when I dropt the Tincture of Galls and Sumach upon the Water, it was a fine purple Colour, which gradually went off again as the Tincture diffused it self: next Morning I found the Glass of Water with Solution of Silver had a large Sediment, as above, that with Tincture of Galls was of a Sack Colour at the bottom, with a purple Scum at top, and blue for half an Inch under it; that with Tincture of Logwood was of a deep reddish Brown, the rest were intirely the same as before. *October 30*, I made the like Trials at home, when the Water had been carried sixteen Miles, and stood five Days, the Success was as follows, *viz.* Solution of Silver made it first white, then presently of a lead Colour; after twenty Hours standing, the Liquor was clear, with a black Precipitation, but had a purple Cast in another Day; with Tincture of Rhubarb, it was of a reddish Yellow; whitish with Solution of Sublimate, having a Scum upon it of a light blue and red; with Solution of Sugar of Lead, it was first of a milky White, then became very clear, and let fall a large white Sediment both on the sides and bottom of the Glass; Oil of Tartar, gave it at first a pale Whiteness, but it was soon perfectly clear again, with a white Sediment like a piece of Gold-beaters Bladder; the acid Spirits produc'd the same intestine Motion and bubbling, as before; Spirit of Hartshorn had the same Effect as Oil of *Tartar*, only its Sediment was like a little Wool or Cotton; Tincture of Sanders made it yellow between the Eye and the Light, but a fine blue sideway; Tincture of Brazil gave

gave it first a pale light Red, which the next Day was much deeper ; Tincture of Logwood turned it a deep dark Red ; Tincture of Sumach and Galls changed it to a muddy Colour, with a green Scum, which tinged the whole Glas in five Days ; Solution of Coperas, two Years old, turned it first to a reddish Brown, then to a pale Oker, and let fall a reddish Sediment; Solution of Salt Peter turned it yellow at the Bottom, pale above and full of Clouds, and then let fall a yellow Sediment. The Glas which had the Solution of Silver in it, was changed to a light Purple, when it had stood four Days, that with Tincture of Rhubarb had let fall a light yellow Sediment, and those with Syrup of Violets and Galls were entirely Green.

March 8, I returned to *Matlock*, the Day being uncommonly dry, warm and pleasant for this Season, but very unexpectedly, we had a strong Frost, and a great Shower of Snow that Night. I had now another small Thermometer, of the same Length with the former, but its Bore was only one twenty seventh of an Inch ; the Spirits at this Season were all within the Ball, and above them a bubble of Air equal to one Inch of the Bore, the larger Thermometer was four eighths above the first Inch, or seven eighths above the Ball ; the common Thermometer twenty five below temperate. Setting the two first in the River *Derwent*, the Spirits in the larger rose one eighth of an Inch, in the smaller they just filled the Ball without any Appearance of them in the Tube: Removing them into the Bath, the lesser rose to six Inches seven eighths, the larger to two Inches seven eighths ; the Bath Water now weighed a Dram in a Pint lighter than common Water, and so did that behind the Stable, which raised the Spirits in this small Thermometer to five Inches six Eighths, and those in the large one to two Inches six eighths, (Note the Bore of the large Tube was one eighth of an Inch,) the furthest Spring of the warm Well Waters raised the Spirits in the smaller Tube to six Inches two eighths, and those in the larger to two Inches six eighths and a half ; this was thirty four Grains in a Pint lighter than common Water ; the nearest of the warm Well Springs raised the Spirits in both to the same Height with that behind the Stable ; the middle raised the Spirits in the first Tube to seven Inches, those in the last to two Inches seven eighths and a half, so that this Spring is the warmest of all by one fifty sixth Part, tho' uncovered and exposed to the Air and Frost. Twenty Yards West of this is another warm Spring, which I did not discover till it was too late to make a Trial of it.

March 11, at six in the Morning, having a clear Sky, sharp piercing Wind, and hard Frost, I put equal Quantities of the *Bath* and *Derwent*
P Waters

Waters into two Tea Cups, and set them out to Freeze, the last began to project its Icicles in fourteen Minutes, from North to South, the first in thirty three, from North-east to South-west, these were sharp at the Point like a Dart, till they reached the opposite side, and then others arising from West to East, and rejoining together, formed the most exact and beautiful Crystals of Nitre, but the *Derwent* Crystals were confused, and reducible to no particular Form, stretching out from North to South, and from South to North; this was frozen over in forty Minutes, tho' the Sun was up to warm the Atmosphere, the other in fifty two Minutes. I then took of the Bath Water, and common Water of the same Warmth, and set both in a Window facing the North, the latter began to freeze in twenty two Minutes, the former had not the least tendency to it in forty seven, till I put a handful of Salt under the Cup; its Crystals or Icicles were of the same Figure as before. The common Water when frozen was convex in the middle, and the Bath Water concave. The same Morning I put two Quarts of boiling Water to nine Quarts of cold Water, and putting the small Thermometer into it, the Spirits, which were got within the Ball, rose to five Inches. I threw in a Pint more of boiling Water, this raised the Spirits to six Inches and a half, then I added another half Pint, which raised the Spirits to seven Inches, the same Warmth with the Middle warm well Spring, for here the Spirits in the larger Tube stood one eighth below the third Inch; neither of them rose any higher, but gradually sunk as the Water cooled. From whence we plainly see, that when the common Thermometers have their Spirits twenty five below temperate, five Pints and a half of boiling Water put to nine Quarts of common cold Water, at the Distance of fifteen Minutes from pouring in the first two Quarts, makes the exact warmth of this middle warm well Spring. I forgot to mention in its proper Place, that Croilstone powdered and put into the warm Water, had no smell, it changed Silver to a Copper Colour, yet altered not its Solution: But four Parts of Croilstone and one of Brimstone powdered together and put into warm Water smell'd strong of Sulphur, turned Silver of a Copper Colour, and made Solution of Silver, and Sugar of Lead, jet black, and let fall a large black Sediment, when this mixture was boiling hot all these Symptoms were much increased: black Limestone Powder mixed with one sixth Part of Brimstone and infused in warm Water neither smell'd much, nor stained Silver, or alter'd its Solution, but when set over a small Fire a few Minutes, then it stained Silver, turned its Solution brown, and when boiled four Minutes it made this Solution black. But this Mixture with burnt Limestone stunk immediately, and had an

an intolerable Smell when set over the Fire, its Steam turned Silver first of a Copper Colour, and then black, it made the Solutions of Silver, sublimate, and Sugar of Lead, a raven black, and presently precipitated the Sulphur and Metals; even the fourth Decoction of Water on these Materials stunk intolerably, and discoloured Silver.

June 7, being one of the hottest Days we had in the whole Summer, I took two Thermometers, (the bore of the smaller was one twenty seventh of an Inch, the Bore of the larger one twenty third,) and set them into the Bath, at nine at Night the Spirits in the smaller Tube rose to eight Inches and three eighths, those in the larger to seven Inches and a half; in the Spring behind the Stable, the Spirits in the small Tube were at eight Inches one eighth, in the larger at six Inches seven eighths; in common Water, the Spirits in the first were at five Inches six eighths in the last at five Inches and a half. The next Morning at five a Clock, the Spirits in the smaller Tube stood at one Inch above the Ball, in the open Air, those in the larger at two eighths, below the third Inch; set in the *Derwent* the first rose to four Inches three fourths, the last to five Inches three eighths; The Spring behind the Stable raised the Spirits in the small Tube to seven Inches one eighth and a half, those in the larger to eight Inches and one eighth: The first warm Water raised the Spirits to seven Inches and seven eighths, the second to eight Inches and a quarter, in the small Tube.

September 17, I exhaled six Pints and a half of this warm Bath Water, and had twenty eight Grains of Sediment, exceeding white, which fermented violently with Acids even distilled Vinegar, or Lemon Juice, and turned syrup of Violets Green.

March 10, 11, I exhaled eight Pints and a half of the same Water, and had forty Grains of Sediment, thirteen of which was Salt, and the rest a very white alkaline Earth; this being calcined in a Furnace, the Loadstone attracted some small Part of it; the Salt laid on a red hot Iron, crackl'd, swell'd, and bleb'd a little, but did not fly about; it fermented with Oil of Vitriol, precipitated the Solution of Silver, and turned white in Water with Oil of Tartar or Spirits of Hartshorn, but neither blue, nor Purple with Logwood, or Sumach: I purified some of it from the Earth, dissolved it again in Water, and set it by to crystalize, it soon projected Crystals of Nitre and Marine Salt, the first in greatest Plenty. Eleven Quarts of that Water which is next above the warm well Springs exhaled, left five Scruples and four Grains of white Sediment, which was of the same Alkaline Nature with the other. Its calcined Earth was some Part of it attracted by the Loadstone; its Salt which is one half of this Sediment crystalized, with

some Difficulty into Nitre and Marine Salt. Twenty quarts from the Spring behind the Stable afforded one hundred and fifty four Grains of white alkaline Sediment, twenty five of which was Earth, twelve Quarts of the middle warm Well Spring left ninety three Grains of Sediment, forty whereof was Salt, nitre and marine; fourteen quarts of the farther Spring exhaled, left six Scruples of Sediment, fifty Grains of which was Earth; ten quarts of the warm Water out of *Balls-Eye* left sixty Grains of Sediment, forty of which was Earth, the rest Nitre and marine Salt; fourteen Quarts from the Cobler Shaft left one hundred and two Grains of Sediment, forty five of which was Salt. All these Sediments were white, all of them contained some Particles which answered to the Loadstone, all were very Alkaline, and the Earth of them very rough.

1. From the preceding History and Experiments, it is sufficiently apparent, that the Soil and Vegetables of this Place are warm, tho' it stands high, and exposed to Northern Winds. 2. And that the Waters, which are very clear and light, contain but little Earth, for the whole Sediment is to the Vehicle, but as one to 1536 (that is, 10 Grains to a Quart) and therefore the Earth, exclusive of the Salt, is but as one to 2268, supposing two parts of the Sediment to be Earth, which is a greater Proportion than this and several other warm Springs will allow. 3. The Earth of this Mineral Water is of a more attractive and petrifying Nature, than any other that has yet been discover'd in *England*, as is evident from the large Heaps or rather Mountains of Petrefactions we find here. 4. And yet it is plain, that this power of Attraction either acts not at all, or very insensibly, while the Waters retain their Warmth and Motion, or while these Particles of Earth are mixt with a large Body of Water, which prevents their Influence on one another, for we find few or no Petrefactions in the Springs and brisker Streams; but where the Waters have lost much of their Warmth and Motion, there the Neighbouring Earth strains off the purer Element, and draws to itself the grosser Particles, which are then got within the proper Sphere of Attraction. 5. Whence it is also manifest, that this Earth must exist, and be mixed with the Water, in very small Particles. 6 And from their strong attractive Force, we may conclude, that their Figures are most likely to be spherical, as there is the greatest Solidity under this Surface, and therefore the strongest Attraction, and what renders this more probable is the hardness and weight of the Petrefactions themselves. 7. But whatever their Form or Figure be, they appear to be only Limestone-Earth; for a piece of these Petrefactions when thoroughly burnt, and put cold into Water, will make it
bubble

bubble and smook like unquenched Lime, it soon loses its former hardness and figure, and falls down into a white Powder. 8. These Petrefactions, I say, appear to be only Limestone-Earth by this Experiment; but taking a Piece Three-penny-weight and six Grains, and thoroughly heating it in a small Fire, it was still hard when I took it out, and was One-penny-weight and six Grains lighter than before; a Piece Eight-penny-weight, having lain an Hour in a strong Fire, lost Five-penny-weight, it tasted Nitrous, and communicated the same Quality to the Water when it was fallen down, and had stood half an Hour. None, I suppose, will assert that this was Earth and Salt, which was lost in the Fire, and Phlegm or Water it was not, for the Petrefaction had lain a Year in a very dry Place; therefore it must be Sulphur, which being consumed by the Fire, the Earth had lost its Cohesion when put into the Water, and so fell down in a white Powder: That mere Earth gave this Nitrous Taste is improbable, and the other Principles being gone, it must be Salt: Nor can we imagine that this Salt was the effect or product of the Fire, since it was but a little time there, and differ'd from the Taste of *Aquæ calcis*, nor will the Infusion of another Stone or Earth, when burnt, communicate the same Nitrous Taste to Water; from whence I conclude that these Petrefactions consist of Limestone-powder, Nitre and Sulphur, for had there been any Sea-Salt in them, it would certainly have discover'd itself by crakling and breaking in the Fire. 9. The warm Waters therefore which produce the Petrefactions must be strongly impregnated with these particular Principles. And that the petrifying Particles are very small, is manifest from their penetrating the Substance, without destroying the Figure of those Vegetables whose Parts they have consumed and wasted. 10. From the Experiments on Caukstone and Croilstone calcined, since the Solution of Silver, and Tincture of Nephretic-wood turn the Infusion of the first white, we see that it affords a Marine Salt; and that the last being blue with Solution of Silver, a deep green with Tincture of Nephretic-wood, a deep red with the Tincture of Rhubarb and Logwood, white, with much Sediment, with the Oil of Tartar, of a deep green, in eight Hours, with Tincture of Galls, contains a Nitre, but of so alkaline a Nature by Calcination, that it is the same with that of Limestone. Here we may also observe, that the Croilstone itself is a kind of Limestone, since it becomes white with burning, whether it was blue or black before, this Colour it derives from the Sulphur which is consumed in the Fire. 11. From the Trials made on Chertstone, both crude and calcined, it is plain, that this communicates nothing to the Waters. 12. And also, from those

those made on Toadstone and Blackstone by Colourations, that they contribute nothing of a chalybeat Principle to their Infusions; but yet it is manifest they afford some Nitre, since they turn white, and Precipitate with Oil of Tartar and Spirit of Hartshorn, very red with Tincture of Logwood, and green with Gall and Sumach. 13. The saline Efflorescences, and beginning Petrefactions, we are satisfied, from the former Experiments, afford, both of them, plenty of Nitre, and the last a deal of calcarious Earth. 14. Since the Ore in smelting produces a strong blue Flame and Stench, and the Rocks in working emit a greasy Substance, since the Petrefactions lose so much of their weight, and the Croil-stone becomes white by burning, we have no room to doubt of a plentiful Existence of Sulphur here. 15. And as the Tincture of Galls gives the Water a simple Colour by Candlelight, and leaves a Purple Scum upon it, and the Load-stone attracts some part of the calcined Earth, we must allow it to be lightly impregnated with Iron. 16. Since the Petrefactions neither crackle nor break in the Fire, nor their Infusion, when calcined, precipitate a Solution of Silver, we conclude that they contain no marine Salt, that remaining in the filtered Water, after these petrifying Principles are drawn from it. 17. Here then, as well as at *Buxton*, we find that it is a Combination of several Minerals or Fossils that warms and impregnates this Water, since wherever it is warm, we meet with black Croil, Spar, Cauck, Lead-ore, and Lime-stone, from which, and no other Principles, our present Water derives its Warmth, for it fairly appeareth by Experiment, that neither Lime-stone alone, nor Croil-stone produces this Effect, but a mixture of both. 18. From the whole, we have proved that this Water contains calcarious Earth, a very little Iron-stone, Sulphur in Vapour or Steam, Marine Salt and Nitre, and that there is no sixth Principle or Ingredient, besides the fine common Vehicle.

The Differences betwixt *Buxton* and this are, *First*, The last contains less Sulphur and Mineral Spirit, since it is colder and emits not such a Steam; it has less Air in its Pores, seeing it is heavier, and has no Bubbles rising up; but it has more of the calcarious Earth and Fossils in it, seeing it curdles Soap, and will not wash till it has stood some time, and also leaves more earthy Sediment, and parts with more by Solution of Sugar of Lead, and made a stronger Ebullition with the acid Spirits.

These Inferences afford us the following practical Uses. First, here is a most pliant, thin, sweet, dry Air, and also all the Objects that can allure and charm the outward Senses. Of what special benefit the first is in many chronic Diseases, few, that know any thing of
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of Physick, can be ignorant; and also that the last tend to divert and call off the Mind from intently dwelling either upon bodily Disorders, or its own Grievs, and bring on a new set of Ideas; for gloomy melancholy Thoughts do not a little dispirit the Body, affect the Circulations and Secretions, and often occasion chronic Disorders, first imaginary, then real. 2. Again, tho' the Earth in this Water petrify and attract most powerfully, yet since it acts not in this manner before it hath lost both Heat and Motion, and had most of the Vehicle strained off in the Earth as a Sponge, then we have nothing to fear from it in our Bodies, where its Heat and Motion are much greater, besides a number of other Materials mixt with its Parts, which prevent their attractive Force and Influence. 3. And since this Earth is of such an alkaline Nature, being only Limestone, it must therefore be a great sweetner of acid Humours, and absorbent of the Acrid, a drier up of too great Humidity and redundant Serosities of the Animal Juices; for allowing the Water should at first encrease them, yet it is thinner, and together with these its saline Parts will be carried off by Urine, whilst the earthy Parts are retained longer in the Body and answer the intent of an Alterative better. 4. But should there still some fear remain, that this Water being of such a petrifying Nature, may at least form some small grosser Parts and thence occasion several Obstructions. It may be sufficient to say in Answer, That we find no Petrefactions without Nitre, but the Nitre in the Water being changed by the sundry Actions, Digestions, and mixtures in the Body, so as there remain no more traces of it; it is not then possible for any kind of Petrefactions to happen from this Matter. 5. But as this Earth is not wholly Calcarious, but has a small mixture of Iron-stone, it is so far astringent, helps to bind up the Parts, strengthening the Weak, and straitening the Diameters of the lax Vessels, for its Particles being small and spherical give no stimulus, Pain or uneasy Sensation. 6. Tho' these earthy Parts do move, and are equally mixt with the other Parts of the Blood in the larger Vessels, whose Strength is greater, and the Bloods Motion quicker; yet from certain hydrostatic Laws, first the Blood moves with greater briskness in the Middle than at the Sides of the Cylindric Vessels. Secondly, the grosser Parts of the Blood being less susceptible of Motion than the smaller, the first will always be in that Part of the Vessel where the Motion is slowest, therefore in the smaller Vessels, where the Secretions are performed, will the use of this Earth be greatest. 7. This Water having less heat, is therefore less impregnated with volatile and active Particles, they have also more Nitre; hence they thin, heat, and rarefy the Blood, and relax the Vessels

sels less than the more warm; it is therefore more safe in hectic, plethoric, and sanguine Constitutions, where there is too great a fulness of Juices, a quick and strong Pulse, too plentiful Secretions, a colliquation of the Blood, and a distention of the Vessels.

From these Principles and the known Effects of these Waters, we conclude, that their primary Use, and chief Service of drinking those Waters, is in all moderate spittings of Blood, whither from the Lungs, Wind-pipe, or Stomach; as also in discharges of Blood from the Mouth, Palate, and Gums, as in small scorbutic Ulcers which often infest and corrode those Parts; in bloody Urine, bloody Stools, and frequent Hemorrhages at the Nose; In all inward Ulcers, discharging purulent Matter, whether of the Kidneys, Bladder, Ureters, Intestines, Stomach, or other Bowels of the Breast or Belly; in a *Diabetes*, or too plentiful discharge of pale, crude, sweet Urine, vastly exceeding the proportion of Drink taken into the Body, attended with violent Thirst. In hectic Fevers, with a thin Habit, quick Pulse, red flushing Complexion, especially after eating, or any least Exercise, which otherwise should only promote Digestion, Circulation, Secretion and Evacuation; but in all these Cases we strictly forbid Bathing, as it gives the Blood-Vessels on the Surface of the Body too great a Pressure, and thereby throws the Blood too suddenly, and in too great Quantities upon the weakened, distended or broken Vessels within the Body, and thereby either causes fresh Breaches, or larger Discharges, and also as it promotes a greater Perspiration than hectic, lean, diabetic Persons can bear; and since this Water neither heats, thins, nor rarefies the Blood, and seeing its earthy Parts have no small share in its Cures; then in a *Diabetes* there is no need of such Caution, with respect to the Quantity that may be drank in this Case, as is necessary about those Waters that are warmer, contain more Spirits, and more rarefy the Blood, such may safely and freely drink as much as the Stomach will bear. Indeed weak People, in other Cases, might boyl it away to one third or fourth Part, and then drink it cold; but then the Vehicle and Sediment separate, as we see in its being an excellent Water for washing and whitening, when taken up, and stood forty or forty eight Hours. But some object and say, if the earthy Parts are so instrumental in its Cures, then to powder the Petrefactions is the best and shortest Way to come at what is most valuable for this Purpose; but this is quibbling, since they cannot be reduced to such subtle and impalpable Parts as they were before in the Water; they will do indeed in some Cases where the testaceous Powders come in play, but they are not fit to enter the small Vessels at first; they want also the assistance of the Vehicle, which
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however overlooked by some, is never to be forgotten. The Sulphur of these is also now inseparable from the Earth without the help of a Fire; these are wholly destitute of the help of the chalybeat Principle; nor will their Salts now so readily part with the Earth. Drinking and Bathing agree very well in Gleets, *Fluor albus*, Cancer and King's Evil; but we by all means advise the Use of bathing in Rheumatisms, weakness of the Parts, Strains, Scurvy, Itch, Scab, and other Diseases of the Skin, as Morpew, livid Spots, &c. Drinking is also useful in want of Appetite, Indigestion, and heat of the Stomach and Bowels, for tho' it render the Body costive, yet it cools those Parts by its common Vehicle, it sheaths and washes off the saline Parts which occasion that Heat, or takes off any Cramp or Contraction of the Parts, as in bilious Cholicks, where both the Vehicle and Alcaline Earth are of very great Use.

Since Bathing here neither heats the Body, nor relaxes it so much, it may be allowed from ten to thirty or forty Minutes, as the Patients strength will bear; but see it be always upon an empty Stomach; and therefore either early in the Morning, or late in the Evening before Supper but the first is best, before Light and solar Rays have too much diffipated the Spirit of the Bath; let the Body be well dried and rubbed after it, and gentle Exercise used to promote Circulation and Perspiration. I hope in any kind of unnatural Discharge of Blood, I need not precaution the Patient against much, but especially violent Exercises, which may heat the Body, and encrease the Bloods Motion and Force against the Vessels. In hectic Fevers, inward Ulcers, Atrophy, and Blood-spitting, I should advise the Waters either to be drank with Milk, or a Milk-diet to be used with them, and forbid the Use of all spirituous Liquors, as Wine, Ale, Punch, but especially Drams of any kind of Spirits: Nor is it proper in these Cases to allow Meats of heavy Digestion, which require much Time and Force to carry off, or heat the Body much, or quicken the Pulse, as Goose, Turkey, Duck, Salt Meats, Cheese, Beef or Mutton; but above all hot Pickles, Aromatics and Sauces, are all contrary to the Intentions of this Water. In Hectics, Butter-milkdrunk can never be enough praised and admired. The Waters should be drank in the Morning, the sooner the better; three or four Pints here may be allowed each Forenoon, Breakfast about eight o'Clock on Bohea Tea, Chocolate made small, or a thin Chocolate made of the weakest Bohea Tea, or on Milk; in some Cases Green Tea or Coffee may be allowed. Dine at one o'Clock, and Sup between six and seven, or seven at farthest, on things of easy Digestion; and going to Bed, I should advise drinking half a Pint of Water. The

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Drinkers

Drinkers will find it necessary to remit some Days, to prevent the Waters palling the Appetite, inducing a Faintness, Indigestion and Dispiritedness; and having once entered upon a Course of these Waters, nothing but great necessity should allow the Use of any evacuating Medicines, for they often prevent their good Effects, and always retard them; but as it is impossible to give particular Directions, suited to all Cases and Constitutions at all Times, so these general Directions shall suffice, only these Waters may safely be used by all Ages and Sexes, even in the hottest Season, without danger. Both the kind of Exercises and their Degree must be suited to the Season, as gentle Riding, easy Walking, bowling, Billiards, &c. and for Diversion, Cards, Musick, Cheerfulness, Chess, &c. but all at proper Hours, innocently and moderately.

From *Matlock* to *Middleton Bath* is two Miles South-West; this rises up close by the South Side of *Bonsal Brook*, at the Foot of a very high, steep Mountain, which consists chiefly of Limestone, with some Lead Ore, a little Copper, Blackstone, &c. little or no Shale, Brasil, nor *Lapis Calaminaris*: This Bath is a long Mile from *Middleton*, (both being Part of the Estate of that worthy and ingenious Gentleman *John Gell*, of *Hopton Esq*;) and two Miles from *Wirksworth*; it is sixteen Yards long, seven broad, and two deep, in the middle of a very irregular Figure; it immediately empties itself into the Brook by it, throwing out a prodigious and incommensurable quantity of Water, it cannot discharge less than three thousand Gallons in an Hour, it is continually bubbling up in a very fierce Manner; but when the Brook is full, the first is swallowed up of the last, till it falls, then the Bath appears again. The Stones in the bottom are exceeding clean and white, the Water clear and pleasant tasted, and weighs considerably lighter than common Water; it putrifies in eight or ten Days time, but recovers itself very soon, and never corrupts after. Both Thermometers (*viz.* that the Diameter of whose Bore was one twenty third of an Inch, and the other of one twenty seventh of an Inch) set in the Brook half an Hour, the Spirits in the small Bore were two Inches one eighth above the Ball, those in the larger Tube were three Inches six eighths; both set in the Bath, the Spirits in the first rose to six Inches five eighths, those in the last to six Inches and a half. This Water with Solution of Silver was a much whiter Pearl than common Water, and very yellow with Solution of Mercury, which changed not the last. Oyl of Tartar made the first white, but not the last. Tincture of Logwood changed the first much redder than the last. It is great pity that this Bath cannot be more easily come at, nor provided with suitable and necessary Accom-

Accommodations, for its mineral Spirit, rich sulphureous Vapour, thinning, heating and drying Qualities are capable of producing far greater and nobler Services than it has for some Ages been put to, *viz.* curing of mangey Horses and Dogs. Three Quarts of this Water exhaled left eight Grains of Sediment, white as Snow, five Grains of it was Salt, which dissolved and set to crystalize, it projected Crystals of marine Salt and Nitre, of each near equal Quantities; hence it is plain the Effects of this Water depend not on its fixt Parts, which bear so small a Proportion to the Vehicle as one to between five and six thousand; but chiefly on its Volatile, wherewith it is richly and highly impregnated, fitted to answer the Use of thinning the Blood, cleansing the Glands and small Vessels, dissolving saline, earthy, or too nutritious Concretions, to relax the stiff, soften the rigid, widen the contracted Solids or Vessels, cleanse the Skin, and sweeten the Blood. Hence its uses are chiefly in the Scab, Itch, Morpew, Kings Evil, all defilements of the Skin, Rheumatism, Strains, old Aches, Cramps, Convulsions, Pains of any Member before change of Weather, Bruises, Lameness, Numbness and Weakness; these are the chief Intentions it will answer by Bathing; and for drinking warm, it cleanses the Stomach, gives or encreases the Appetite, promotes Digestion, thins the Blood, Chyle, and Lymph, prevents Obstructions, insensibly wastes hard Tumours; but does mischief in hectic Fevers, wasted and emaciated Bodies, is bad in Consumptions, spitting of Blood or other Hemorrhages: or in a rarefied State of the Blood, or where the Pulse is very quick, the Use of it should be attended with the above Rules.

Two Miles from this and three from *Matlock* is *Wirksworth*, where instead of Springs we have two warm Brooks, one on the East Side, the other on the West Side of the Town, they both being a beautiful transparent Water, which tinges not their Streams nor Springs, are considerably lighter than common Water. That on the East Side of the Town is a Sough or Level a Mile long, made for carrying the Water from their former Lead Works; where it appears first to the Day, they have made a very convenient Bath. There was formerly here a very good warm Spring, but by sinking so many Shafts in Quest of Lead, they lost it and most of their cold Springs. On this Side of the Town, there is first Corn Mould from four Foot to two Fathoms, then Shale or Lime-Stone, then thin Beds of Clay, under which lie Caulk Spar and Ore, and sometimes all a Vein of Spar. The Sough on the West-Side of the Town made in Search of Lime-stone about one and forty Years ago, where the Workmen began at the South End of the Town, and carried the Level close up the West Side and

found no Lime-stone, but when they had carried their Sough about two hundred Yards, (being then nine Fathom under Ground) they came to very much Lead and a strong Current of warm Water from the North East Side, and another smaller Current of cold Water from the South West, both which met in the Bottom of the Shaft, and made a tepid Water. They had before this much intensely cold shale Water, which so chilled the Workmens Feet and Legs, that they could not bear it without a Fire. The small Thermometer in a hot summers Day, having its Spirits up at four Inches in the open Air, and at two Inches in common Water, they mounted up to six Inches here in both warm Brooks. Six Gallons of this Water exhaled left five Scruples fourteen Grains of Sediment, fifty five whereof was white Earth, the Salt crystalized into marine and nitre Crystals. Here is much *Lapis Calaminaris* got, but none near so deep as the Rise of the warm Waters; this consumes all Lead near it, and if the Workmen find much of this they lose Hopes of Lead, and we find no warm Waters in this County but where there is Lead. These Brooks being so full of small Lead Ore ever since they were Soughs, there is therefore no Use to be made of them inwardly, only outwardly they serve for a tepid Bath.

From *Wirksworth* come we to *Stony Middleton*, which is nine Miles South West of *Sheffield*, eight Miles from *Chesterfield*, as much from *Buxton*, and nine from *Matlock*. This Village stands on the North East Side of a steep Hill, at the Foot of which is a large Brook, on the North Side whereof is a much higher and steeper Mountain, being a Mile and a quarter from top to bottom. The Situation is very Romantick, the Ground all very dry and pleasant, the Water good and sweet, being strained through those large Mountains of Lime-stone; the Air pure, thin, wholesome and very fragrant in Summer, and at a little Distance several fine Groves of Woods; all about beautiful Grass and Corn Fields, along the Sides of those high Mountains. From East to West on the Side of this Brook, runs a very High, long Ridge of Lime-stone Rocks full of finous Grottoes, several whereof communicate with one another and run into the Mountain above. ^a At the Foot

^a The highest of these Rocks is called the windy Torr, from the Top of which, to the Mouth of *Bossen Hole*, (*Bossen* in this Country Dialect is *Badger*) is fifty five Yards perpendicular, and thirty Yards below the Hole to the Brook; the Entry to this Cave is a small foot road, about a Yard broad, like a Walk in the Middle

of the Rock, the Entry in is of the same Breadth and five Feet high; an excellent Shelter for Sheep in northerly and easterly Blasts. About eight Yards within turning to the left Hand, you climb a steep Rock five Foot high, where you find one Cave turn to the Right, another to the left Hand, about a Foot high and a Foot broad, the Stone

Foot of this high Mountain on the North Side of the Town, rises first the drinking warm Spring, out of a Rock and falls down on the Earth below, but having no Basen to receive it, it cannot be measured without a great deal of trouble, however it cannot send forth less than twelve hundred Gallons of Water in an Hour; it weighs lighter than common Water rarefied by the Sun's Heat in an excessive hot Day, wherein the Spirits in my Thermometers were up at eight Inches, and put into the Brook, the Spirits in the small Bores subsided to the second Inch, and these in the large to two Inches five eighths; both set in this drinking Water, the Spirits rose again to one below six. The Bath is about eight Yards South West of this Spring, it is enclosed with a Wall four Yards high, four Square, six Yards every Way, on its in-

Stone on each Side is Toadstone, these are passable about thirty two Yards each, and then turns so narrow you can follow it no further. A little West of this is *Charlestown*, this has a Majestic Appearance, lies at the Foot of a very steep Rock, ninety three Yards High, and five Yards above the Level of the Brook, its Entry is six Yards high and eight wide, here you walk on for fifty two Yards and a half, where you arrive at an unpassable deep stagnant Lake, this Cave reaches quite through the Mountains and opens into *Eynedale*, which is above half a Mile; by another of its Grottoes, it opens near *Fowlow* which is a Mile and a half, passing quite under *Eyan* Church. Forty four Yards above this, is the Entry into *Bamforth Hole*, which is forty nine Yards from the Top of the Rock, and as much from the small Brook; the Entry is five Foot high, then you go down one shoulder foremost for forty Yards, then rise up thirteen Yards; in all this Way it is not above a Yard Wide, and at last climb a Step six Foot high, where you enter the Middle of a large Cave, which extends it self before and behind, here your Toil is rewarded in seeing great Variety of Stalactitious Petrefactions. But leaving the Cave behind, go twenty five Yards forward, you are introduced into a most magnificent subterranean state Room nine Yards wide, and two high; the most state-

ly, and awful Dome I ever saw, its Roof Floor and Sides are all shining with endless Numbers and Variety of beautiful transparent Statues, with several regular Ranks of fine Pyramids, and other curious Figures, some upon Pedestals, others reaching the Roof, others wishing to support this Reproach of Art, as afraid that Time might spoil the Glory of this solemn Dome, reach from the Roof to the Floor. In the Middle of this Room is a Basen three Yards long and two wide, on each Side of it is a stately Pillar of *Stalactites*, one fine polished Marble and another in the Middle upon a Pedestal, through the Bottom of this is a very small Passage a few Feet down into another Entry to several other Caves still lower. The Roof of this Vault is beautifully adorned with all Kinds of Shells here generated and generating of sundry Colours, and no less Beauty and Variety, interwrought with many other curious Figures. A little beyond this is a fine stone Pillar supporting the Roof. On the right Hand of this Cave, are openings into two others at ten Yards distance. I went three hundred and sixty four Yards into this Cave, the same Entertainment and Curiosity all along, and many other Caves going off on all Sides, and saw no End of them, but they going on under the whole Mountain like Coney-burrows.

side

side is a stone Walk round the Bath, it is open above: The Thermometers put in here, the Spirits rose to six Inches one eighth, the Water bubbles up continually with great Force in all Parts as in *Buxton*; it is a very large and plentiful Spring, every extraneous Body fallen into it in a few Days appears very blue, but taken out, it is white in the Air; then we have three perpetual bubbling warm Springs close by the West Side of the Church Yard, each whereof raised the Spirits in the Tubes to six Inches; *November 27*, being a hard Frost for forty eight Hours before and a little Snow, I took the Thermometer which I had used there the Summer before (the Diameter of its Bore being one twenty second of an Inch) whose Spirit the Warmth of this Water had raised to one eighth above the third Inch, tho' these by the Church Yard made the Spirits subside to two Inches and a half, being about eighty Yards nearer the Town and farther from the Mountain, in which Course it cooled more than the first Spring and Bath; but in the above Frost, the Spirits in the Thermometer being only one eighth of an Inch above the Ball, set in the Bath, it raised it one eighth below the third Inch, the drinking Water two eighths above the third Inch. So that this Water in frost or cold Weather, is one twenty sixth Part warmer than in Summer, and the increased Heat of the Springs by the Church Yard Side in Summer equal to the Warmth of the other two, is from the Earths Surface above them heated by the hot Weather, and the Heat and Rays of the Sun reflected by the Stone Walls near them upon the Water. This Water weighed fifty Grains in a Pint lighter in Winter than common Water.

The Lime-stone here seems one Mass of Shells, but all of the cockle and oyster Kind, all Bivalves and Peclinites, and that these are not the *Exuviae* of those Fishes left there by the Deluge, is plain first from the prodigious Quantities of them both here and five Miles about. Secondly from those in *Bamforth* Hole, which are daily forming and growing. There is also some black Lime-stone here, which upon breaking sends forth a strong smell of Sulphur. It is remarkable that in the lead Mines on the other Side of the Mountain above those Springs and about two Fathoms above the Lead Ore, was a Bed of *Boulder* Stones, any one of which being broken it contains from half a Pint to a Gallon of soft *Bitumen* like *Barbadoes* Tarr, it melts before the Sun or Fire to Oil; there were also several Springs in the Mines, that took Fire with a Candle and would burn a Week or Fortnight, and all the Water drilling through this *Stratum* of *Boulder* Stones will take Fire and burn many Days. This Bed was continued between two and three Miles, all along *Hucklewedge* with its burning Waters. Several Damps have

have happened in these Mines without any preceeding visible Cause or Signs, but all being serene and clear in the Works without Fog or Mist; the Sulphur in the Air would fire at the Miners Candles, the Flame run from one End to the other, with a thundering Noise, making the Earth shake, and in two Moments the Sulphur was spent, the Fire extinguished of it self, and all clear again. The only Shift the Workmen have is to clap down on the Earth instantly on their Faces till it is over; sometimes sublimed Flowers of Sulphur gather on the Stone Roof over the Candles, take Fire and burn violently; and this is the most furious Fire Damp they have, scalding the poor Fellows almost to Death: On the North Side of this Mountain, almost opposite to these Springs is a Mine which cannot be wrought; for in picking or striking the Ore, the sudden shaking of the Metal gives such a violent Motion to the Sulphur, that it makes an Explosion like fired Gunpowder, or a Blast in a Rock, so as great Lumps rise up and fly about along with a Kind of *Terræ motus*, or Earthquake. The first Discovery of the above *Stratum* of Boulder Stones happened by a Workmans breaking one of them in raising it, the outside was only a Shell of Stone filled with a soft Matter, wherein he put down his Candle, which burning down to this Substance, it melted and burnt; what remained he took Home, took it out of the Stone into a Saucepan and melted it; then it was an exceeding fine clear Balsam without Smell, except thrown into the Fire; but when cooled again, it hardened like fine Fat; several others of those Stones they broke and found them full of this Substance, wherewith they provided the Neighbourhood a pretty Time for greazing Boots and Shoes, till they found it quickly shriveled them up and burnt them to pieces; great Pity such a fine *Bitumen* or *Oleum Terræ* had been thus wasted.

All these five warm Springs are of the same Kind, and produce the same Colours upon Examination, for they brighten the Solution of Gold, Solution of Silver turns them first of a deep Pearl blue, then white and a large Sediment is let fall. - Solution of Copper turns them of a greenish Blue. Solution of Sugar of Lead first of a Pearl White, then clear with a dark Sediment; Oil of Tartar of a fine Pearl, then a small Sediment. Syrup of Violets first of a whitish Blue then greenish. Tincture of Logwood of a pleasant scarlet Red, Galls of a muddy White, the acid Spirits raised a strong Commotion or Ebullition in it, and Rhenish Wine mixt with it occasioned a great intestine Motion. Fifteen Pints of the Bath boiled away left sixty nine Grains of Sediment, thirty four whereof was Salt, the rest Lime-stone Powder. Sixteen Pints of the drinking Water exhaled left seventy Grains of Sediment, one half

half whereof was Salt, the rest calcarious Earth. The Waters near the Church Yard Side exhaled left near the same Quantity of Sediment, their calcined Earths were scarce influenced by the Load-stone, that of the drinking Water caked like Sea Coal, and was very Light. These Sediments fermented much, smoaked and boiled with Acids, turned Green with Syrup of Violets, and sent forth a volatile Smell or Spirit with *Sal Armoniac*, the Salts crackle and fly on a red Hot Iron, and swell and boil. Made into a *Lixivium* they project Crystals of Nitre and Marine Salt. This Water and *Buxton* will keep a Fortnight in Summer without stinking, *Matlock* twelve Days, *Middleton* Bath Water not above ten Days. It is a Mistake that Mr. *Leighs* Water will not corrupt, for I have had it as bad as any of the rest.

Since this Water comes to us naturally warm, and there is no natural warm Water but what has washed several metallic or mineral Bodies of different Natures, amongst which, upon their Mixture, has happened some Conflict, Ebullition, Fermentation, intestine Commotion or Dissolution (or whatever other Name some please to call it by) of some Parts and Mixture thereof with the Water, for we find that there is no such thing as making Water warm without the Addition of some other Body or Element, or violent Motion (if that will do it) for if it is heated over the Fire or by the Sun, here is the Addition or Mixture of Particles of Fire, fewer or more; but our Water having a natural Warmth, we say it contains these subtle Parts, which were the Effect of this Conflict and Mixture; but these Parts being incoercible and unretainable, after the Warmth of the Water is gone, we therefore call them a mineral Spirit, Vapour, or Steam. But we having traced, and being satisfied of the subterranean Existence of Lime-stone, Lead Ore, a little Iron-Stone, and a very few small Marcasites of Copper, we therefore say this Water washes and is impregnated by these, tho' we pretend not to determine their Mixture and Quantities to one another in these Dark and inaccessible Recesses. We say again that the Water by the Church Yard being naturally cooler than the Bath, and that not quite so warm as the drinking Water which rises up to us at the Foot of the long Descent of this Mountain, at a considerable Distance from its Origine and impregnating Principles, whereby much of the Heat and mineral Spirit is lost in a long Maze of Cliffs, Earth and Crannies; therefore could we come nearer its Origine, we should have the Water much warmer, tho' we presume not to tell its exact Heat even there. Moreover since all these Minerals abound with Sulphur, and not only with gross inseparable, but even Sulphur of such a fine minute Nature, as its Steam mixes with com-

mon

mon Water so as to take and keep Fire so long, and since whole *Strata* of Stones contain of this liquid *Bitumen*, and some of the Shafts cannot be wrought because of it, therefore I say there is also Sulphur in this Water, tho' neither discoverable by Smell, Taste, nor tinging Silver or its Solution, &c. It is plain also from the perpetual and strong bubbling up of this Water, that it contains very much Air in its Pores, in which Air among the Pores of the Water is lodged this mineral Spirit. But besides this Air, Spirit and Sulphur, upon boiling away any Quantity of the Water, you have a Sediment remaining, which we therefore call fixt Parts. But a Part of this Sediment being neither dissolvable in Water, nor calcinable or consumable in Fire, we therefore call this Earth; which Earth raising a violent Fermentation with Oil and Spirit of Vitriol, Spirits of Nitre, Sulphur and Salt, and turning Green with syrup of Violets, we say it is neither acid nor neutral but Alcaline. Again, this Mountain in all Parts abounding with Petrefactions produced by the Lime-stone, (as was proved before) and this Earth being of the very same Nature, and producing all the same Symptoms and Effects with the calcined Petrefactions stript of their Salt, we therefore say that this Earth is chiefly Lime-stone Powder. Again since a Part of this Sediment is dissolvable and passes the filtering Cap clear with Water, and a Powder remains after boiling away this filtered Water, and this Powder having a saline pungent Taste, we say it is Salt. But one Part of this Salt precipitating Solution of Silver, crackling and flying upon a red hot Iron, smelling Urinous with *Sal Armoniac*, fermenting with Acids, and projecting upon Crystallization Crystals like Dice of a cubic Figure, we say this Part is marine Salt; but another Part of this same Salt turning Purple with Solution of silver, red with Tincture of Logwood, green upon long standing with Tinctures of Galls and Sumac, crystalizing into Nitrous Crystals, &c. we therefore say that this is Nitre. And since the Lime-stone which this Water washes has mixt in several Parts with it Marcasites of Iron, and also since we find behind the same Mountain Iron Stone and Ocre, we may justly imagine that there is some chalybeate Principle in the Water, tho' neither visible nor tractable. From the whole we find here a Mineral Spirit, a most fugitive Sulphur, a little Marine Salt and Nitre, but more calcarious Earth; the Nature and Properties of each of which considered separately in their just and natural Proportions, and then mixt give us the Vertues and Uses of these Waters.

Which are thinning, drying, sweetning, cleansing and healing; are good if drunk regularly, in any unnatural Sharpness and Saltness of the
R Blood,

Blood, and Juices therefrom derived, or where the Parts of the Blood are too strong and coherent, or its State too fizy or mucous, or the Vessels loaded with Slime, or abraded by Salt Humours, or contracted so as the vital Liquor has too narrow a Passage; hence it is good in the Heartburn, overflowing of Bile, bilious Cholick, too great Heat and Constriction of the Stomach and Intestines, Costiveness, want of Appetite, Palpitation of the Heart, Shortness of Breath, from either Stimulation or stuffing of the Lungs, or loading of the Blood Vessels with thick gross Humours, heat or stoppage of Urine (except from a large Stone) or where the Kidneys or Ureters are furred up with Sand, Gravel Matter or Slime. In the Scurvy, beginning great in young People; Cancer whilst in *Embryo*. Obstructions of the Glands, Head-achs from a fullness of the Vessels with crude Humours. Bathing here will produce cleanness of the Skin from its Defecation with Scab, Itch, Blotches, slight Kings Evil, Excoriations, Tettars, Ringworms, Scurvy, and Morpew; it will also relieve Bodies labouring under wandering, periodic, arthritic or Rheumatic Pains; or Pains or Lameness from Strains, Bruises, old Fractures or Dislocations, Wrenches, Falls. It will also make its Way into and thin gross Humours in the small Vessels on the Bodies Surface: Hence freer Perspiration, unloading these Vessels, opens the Pores, promotes Circulation, Secretion, Nutrition and Evacuation; braces up the solids first, and gives the Humours the greater Shock, then relaxes them afterwards, and gives the last greater Space to move in. It helps Cramps, Contractions, and Slight Convulsions.

It may be drunk more freely and safely than *Buxton*, as it is cooler, rarefies the Blood and relaxes the Vessels less; but not so freely as *Matlock*; since it certainly has more Sulphur in it, tho' the same Rules in bathing are sufficient. These Waters may be drunk a Fortnight without intermitting, then rest four or five Days or a Week, and drink them again, four Pints a Day is sufficient, and not too much. Their Use will not allow mixing Ale, Punch, Brandy, &c. with them; nor Foods of gross Nourishment and heavy Digestion, nor too violent Exercise, nor night watching and revellings, nor ungoverned furious Passions, nor Indolence, Idleness, and Mopishness. Bath first in the Morning or before Supper on an empty Stomach; the sooner in the Morning the Waters are drank medicinally the better, before the Heat of the Sun and Day have dissipated their Spirit, and take them in small Doses and often, as a third Part of a Pint every half Hour.

As to the different Degrees of Heat in those Waters, and their Proportion to the Blood's warmth, take as follows. *October*, 6, 7, 1732, being on both Days very great Rains, I took two Thermometers, the
Diameter

Diameter of ones Bore was one eighth of an Inch; this set half an Hour in the River in a Flood, the Spirits fell down to and stopt at five eighths of an Inch, above the first Inch: The Tube removed from this and set in the main Spring or the Bath another half Hour, the Spirits rose to three Inches three eighths and one half of an eighth. From this I laid it to the Breast of a young healthy Person about nineteen Years of Age, and let it lie above half an Hour, with its whole Ball and lower Part of the Tube compassed on all Sides with the naked Skin before a warm Fire in a close Room; the Spirits rose one Inch and a quarter higher and stopt. Hence I say that since the Bath raised the Spirits one Inch and seven Eighths above common Water, and the Warmth of the Body of a young healthy Person raised the Spirits only six eighths of an Inch higher; then the Warmth of the Bath is very near three fourths of the Bodies warmth. Again I took a small Thermometer the Diameter of the Bore of whose Tube was near one twenty third of an Inch; this set in common Water half an Hour with the other, the Spirits sunk down to the first Inch close by the Ball; I then set it in the main Spring of the Bath, the Spirits rose to the eleventh Inch and two eighths and a half. Now if the Bath raised the Spirits in the large Tube fifteen Digits, and the Spirits in the small eighty two and a half, then the Spirits in the last rose just five eighths and a half to one eighth of the first, so that had the Tube of the small Thermometer been long enough, the Spirits by the Body's heat in that Situation, must have risen to fifteen Inches three eighths and a half, which is the same thing, near three fourths of the Body's warmth. Again, the Spirits in the small Tube stopping rather below the first Inch just at the Ball, in the River, and *Matlock* Bath raising it to seven Inches and a half, which is near one half of the Blood's warmth or near a *Medium* between the Heat of the Body and Water, or seventeen thirty two Seconds of the Blood's Heat, *Middleton* Bath raised the Spirits in the small Tube to six Inches and a half, that is, near fifteen thirty two seconds of the Body's Warmth. *Wirksworth* warm Brooks raised the Spirits to the sixth Inch, that is, five Inches above common Water, or a little more than thirteen thirty two seconds of the Body's Heat. I am informed by a worthy ingenious Physician, who was seven Weeks at *Bristol*, that seeing the Pump of that warm water near *St. Vincent's* Rock taken up, he examined the Warmth of the Water, which he found to be about five sevenths of the Blood's Heat; so that *Buxton* is warmer than this.

APPENDIX on the petrifying Waters.

THo' these be not reckoned amongst the Class of medicinal Waters, yet we shall give them a Place here, both because all our warm Waters, especially *Matlock* and *Stony Middleton* are of this Kind, and also tho' they have been hitherto overlookt, or at best esteemed as the pleasant sportings of Nature, yet we shall prove them highly medicinal, and entitled to a Place amongst the very usefulest or noblest Waters or Medicines we to this Day are acquainted with. All the Kinds of Petrefaction performed by those Kind of Waters in this Country may be reduced to those by Incrustation. But if this be thought by some (who always love to run Divisions) too narrow or comprehensive a Definition, we shall divide them into those by Incrustation, Exudation, Filtration, and Attraction; having never yet been so happy after all my diligentest Enquiries, as to find any of those which are said to turn into firm Stone. Those by Incrustation I call such Waters as leave a Powder upon such Materials as lie in their Way: As Grass, Leaves, Moss, Sticks Straws, &c. And of these we have two Sorts, *viz.* Such as have a coarse Powder cleaving to the Surface of those Bodies, without penetrating their Substance; and these Particles are often so gross that you may rub them off with the Hand, or they moulder to Pieces on bending that on which they lie. Or the Parts are of a finer make and penetrate the Interstices and substance of the Matter to which they adhere and fill up even its Vessels retaining still the original Figure of the Body, nor can this Matter be rubbed off. *Secondly*, those formed by Exudation merely without any Stream or Current of Water, but only from the Dew or Steam that sweats out of the lower side of the Rock, where the small watery Vehicle flies off and leaves the Stone Powder and Salt behind it, to coalesce and form a hard Body: We have several Sorts of these all exceeding beautiful and of endless Shapes, representing great Variety of Parts or whole Animals, Vegetables and some Minerals. *Thirdly*, those by Filtration, where the Water is slowly strained through the small Crannies of great Rocks or Mountains of Stone, by drops, where it leaves a Part of its stone Powder on the

Roof

Roof like large Icecles, or on the side Walls like Plaister, on whose Surface are the small Furrows by which the Water drilled down, like so many displays of vegetable or other Bodies; or where the Floor is a hard Stone, which makes way for and drains up the Water, but not the Stone Powder, to which a Part of the Salt adheres: Here as the first Mass or Heap happens to form into any real or imaginary Shape, that which follows retains it. Of these Kind of Petrefactions we have sundry Sorts, as the Sparry exactly like Sparr, only it retains not its Figures, being white, transparent, polished and fine; such are those in *Pools Hole* and many in *Bamforth Hole*; the Stalactitious, which are white, clear, and very solid, but not transparent or like Spar, some white spongy, very light and brittle, as several in *Bamforth Hole*, *Peaks Hole*, &c. Others a dark brown solid, but not very hard. And here give me leave to take Notice of two Errors which have much prevailed. The First is that all those Petrefactions come from Waters warm at their Origine, but cooled in their long Course or Stream coming to us; of the contrary we are certain, since we find such numerous Petrefactions in *Pools Hole*, *Peaks Hole*, *Bamforth Hole* and many others of those Grotto's, whose Roof is not many Yards from the Day, and yet are supplied intirely from that Stone and Mould betwixt the Roof and Day, where we are sure all the Water is cold. We are also convinced from the lead Mines beyond *Buxton*, where the Chasms of the Rocks are wedged up with Petrefactions, which we are sure are formed out of a Water that never was warm. The other Error is that these Waters turn Wood into Stone. I have met with none such, but these I have seen, which in long time waste and consume the Wood and other Vegetables, the Earth gets into the Cavity of their Fibres and Vessels, fills them up, swells and rots the Wood, expels it like a Fungus or Moss, and assumes the exact Figure and Order of those Vessels and Fibres. This I have met with some hundreds of Times, and traced on the same Sort of Wood through all its Stages from the first Incrustation, to the swelling, tearing, and Expulsion of the Wood like Moss or Slime, and to the finishing the Petrefaction; and this is what I suppose has been taken for turning Wood into Stone. The fourth Kind of Petrefaction by Attraction, if such may be called a Petrefaction, is a Concretion of Vitriol Sulphur and Earth under the Receptacle of some chalybeat Waters from a Solution of some subterranean Fossils highly stored with Vitriol, which immediately under the Earth's Surface subsides and separates from the Vehicle, is attached to any vegetable Body or spongy Earth, and becomes a black heavy, nauseous, stinking Vitriolic Mass, which powdered and infused in Water sends out its Vitriol, the Powder

der dried, then put into the Fire on a red hot Iron, the Sulphur smoaks and flares; but to say that these Concretions are from a Solution of the Pyrites, is saying nothing, till I find the learned fix some determinate meaning to the Word, which has been used lately in so lax a Manner, as to communicate no certain Idea. Besides these learned Men tell us that the Pyrites is dissolved under Ground, but the Water that dissolves them brings us no fixed Vitriol, but this Water does afford all this fixt Vitriol, therefore this is no Solution of their Pyrites: Besides we know that this Water is strained through a thick *Stratum* of Shale of about thirty Yards deep below a thin Bed of Clay. But there is yet a fifth Kind of Petrefaction, which as it is the beautifullest of all, so we are intire Strangers to their Manner of Generation, and that is, these transparent, brilliant, solid, hard, hexagonal Gems found like small Marcasites in the Middle of Limestone in *Cornwal*, and *Broughton* near *Settle* in *Yorkshire*, and sometimes near *Castleton* in *Derbyshire*, which are called Diamonds, every whit as fine as *Bristol* Stone, and will cut Glass. They are also found on the Earth's Surface after a sharp shower of Rain near *Buxton* and *Harrigate*. All these Petrefactions are generated during the Winter Season, never in the Summer; and the stormier and colder the Winter, the larger and harder the Petrefactions; all of them except the fourth Sort are indissolvable in Water, but some of them, as Sparr, flows and melts to Water in a hot Fire, and the rest, after a violent Fermentation, are by Acids, as *Aqua Fortis*, dissolvable to a Gelly. These called Diamonds at *Buxton* are comprized under ten, twelve, fourteen, sixteen, or eighteen Planes. They are always Hexagons in the Middle, and where they slope down to form a Pyramid at each End, under as many or fewer Triangles as there are Sides; hence they have four five or six fine polished Triangles. But those found in the plowed Field near *Harrigate*, are not of one certain Figure neither at the Ends nor Middle, being sometimes triagonal, tetragonal, pentagonal, and hexagonal in the last, and each almost differing from another in the first. In several of the *Derbyshire* Grottoes, are Petrefactions so like a Goose's Quill, that if they lay both together on a Table a Stranger would not know one from the other, both having the same Figure, hollow and pith. Were it not for the Brittleness of Spar, and its not enduring Heat, there could be no beautifuller Chimney Pieces and Ornaments for Rooms in the World; it is from this Friableness that *Aldrovandus* calls them *Gemmae inchoatae & non perfectae*, and supposes both Gems and them of the same Nature: Hence from their peeling off in Shales or Scales *Stenow's* Opinion seems true, that their Growth is by an outward Apposition of fresh

fresh crystalline Matter to the external Planes of the already delineated crystal, but not all at the same Time, nor in the same Quantity: Hence the Top Planes of the above crystals are not always equal, these crystals being certainly a fine Kind of Spar. We have Waters whose earthy Parts are so very small, that they are supported by the coldest Springs in the chillest Air, till they fall upon, and penetrate, and insert themselves into the Pores of old solid large Oak Roots, and gather by Degrees till they compress the Fibres, enlarge their Vessels and Interstices, consume and rot the Wood, so as at last nothing remains besides a perfect Stone, of the very Figure and Appearance of the Tree Root, with some small Resemblance of the Lines of the Wood it self; but has lost its Colour, is very brittle and as incombustible as common Stone. In Vinegar it sends out abundance of Air Bubbles, but wholly dissolves into a white Substance in *Aqua Fortis*, with terrible Fermentation, huffing and smoaking. Of this Sort is the Petrefying Water at *Newton Dale* near *Thornton*, which some use medicinally. On the contrary, other incrustating Waters I have met with, whose earthy Particles are so gross and bulky, that they cannot be long and very far supported in cold Water and open Air, but fall down upon the next Body they meet with, and neither penetrate the Substance nor enter the loosest Part because of the Grossness of the earthy Parts, only gather on its Surface like sparkling Sand or soft Stone, and may together with the Bark of the Stick be split off like a Sheath; of this Sort is *Ibberstone* in the Road between *Thornton* and *Scarborough*. But I never met with any Waters which really convert the Substance of Wood into Stone, nor do suppose that these Petrefactions are formed of Water turned into Stone, but of the Limestone Particles conveyed by the Water either to the Day or into the Fissures or Grottoes of those Rocks, and is the same Matter that really was contained in the Water before; and tho' all of them are called *Stony*, yet are there not only different Kinds of them in different Springs, but several Sorts in the same Spring.

The most noted of the petrefying Waters in *Yorkshire*, is the dropping Well at *Knareborough*, which rises up about fourteen Yards below the Top of a small Mountain of Marlestone (properly a Limestone of a very coarse Grain) on the West Side of the Town and River, and about twenty six Yards from the Bank of the *Nid*; then it falls down in the same contracted rapid Stream, about a Yard, and at a second fall at two Yards Distance it comes two Foot lower, then three or four, and so falls upon an easy Ascent, divides and spreads it self upon the Top of an Isthmus of a petrefied Rock generated out of the Water, there falls down round it; about four or five Yards from the River,
the

the Top of this Isthmus or Rock hangs over its bottom four Yards. This Rock is ten Yards high, sixteen Yards long, and from thirteen to sixteen Yards broad; but on the backside it is twelve Yards high. This little Island split down and started from the common Bank about thirty Years ago, and leaves a Chasm between them from a Yard and a half to three Yards wide; in this Chasm on the back and lower Side of the Part that is fallen down, are petrefied Twigs of Trees, Shrubs, and Grass Roots, hanging in most beautiful Pillars all interwoven and forming a great many charming Figures: On the other or common bank Side of the Chasm are whole Banks or Coverings like Stalactites, very hard and inseparable (without breaking) from the Rock where the Water trickles down from the opposite Side. This Spring sends out about twenty Gallons in a Minute of the sweetest Water I ever tasted; from its rise till it fall over the common Bank, are several Petrefactions upon the Stones, but none on the Grass, &c. till it come within two Yards of the bank Top. It springs out of a small Hole like a little Sough in the middle of a thick set of Shrubs. This little Isthmus is beautifully cloathed with Ash, Osier, Elm, Ivy, *Sambucus*, *Cervicaria major*, *Geraniums*, Wood Mercury, Harts Tongue, Sage, Ladies Mantle, Scabious, Cowslips, wild Angelica, Meadow Sweet, Hypericon, &c. This Water both at the Spring and from the Rocks is of equal Weight, and each twenty four Grains in a Pint heavier than common Water. I exhaled eighteen Pints of this Water from the Spring, and it left seventeen Scruples of Sediment; I boiled away nineteen Pints of it as it falls from the supposed petrefying Rock, and it left twenty two Scruples of Sediment, *viz.* eleven twelfths of an Ounce. This Water with Tincture of Rhubarb turns of a fine yellow Colour; with Solution of Sugar of Lead very white and thick, curdles presently and lets fall a large white Sediment; with Oyl of Tartar it is white, turns cloudy, and precipitates a white Sediment; tincture of Galls, Sumac, Green Tea and Red Roses change it not black or purple, but muddy at first, and in three or four Days all green. It precipitates not nor blackens Solution of Silver; it is reddish with Tincture of Logwood. The Sediment, if boiled in a clear Brass Pan is white as the finest chalk; but if boiled in a Pan much sullied and blackened, it is greasy and blackish; half an Ounce of the Sediment of the Water from the Spring, put into Water, let stand till clear, then filtred, that in the Cap dried and weighed had lost four Scruples and four Grains, which was its Salt, this filtred Solution boiled to a *Lixivium* and set to crystalize afforded only Nitre; seven Scruples and four Grains of the Sediment

diment from the Rock, left five Scruples and four Grains of Earth and two Scruples of Salt, which was all projected in Crystals of Nitre.

The next of Note of this Kind, is *Ball* or *Bandwell* at *Stenfield Lincolnshire*, a quarter of a Mile from the Spaw, it is a most pleasant sweet Water, rises up towards the South in a flat Ground under a Fine Wood at the South West End of a Close, and tho' it stinks not, yet leaves much black Sludge, it is neither of a vitriolic Salt, nor tart Taste, but it crudles Soap or Milk like the dropping Well. This Water with Tincture of Rhubarb is of a light yellow, then becomes darker, with Oil of Tartar Pearl Colour, then cloudy and in a few Days precipitates very much, it is muddy and white with the Spirit of Hartshorn, with Syrup of Violets green. It is a fine deep Red with Tincture of Logwood, first white, then green with Tincture of Galls, some of this black Sludge taken out and dried, then thrown on a red hot Iron, smoaked, then threw forth a blue Flame in the dark and stunk much. A Gallon of the Water exhaled left four Scruples of white Sediment, forty four Grains whereof was Earth, and about thirty Grains of Nitre, and eight Grains of Marine Salt, when crystallized.

A quarter of a Mile from this is their bathing Well which is noted for curing Weaknesses, Aches, Cramps, and all Foulness of the Skin, this rises up into a Stone Basen two Foot and a half square, in the middle of a great Bog in a Meadow, on a gentle descent, it has neither Taste nor smell, but leaves much black Sludge in the Bottom. This Water is whitish with Solution of Silver, then purple, green with Tincture of Nephretic Wood, or Syrup of Violets, or Tinctures of Galls or Sumac, white with Solution of sugar of Lead, Oil of Tartar, or Spirit of Hartshorn, and lets fall a Sediment, very red with Tincture of Logwood; both this and *Bandwell* fermented much with the acid Spirits. Ten Pints of this boiled away left three Scruples and six Grains of white Sediment, twenty six whereof was Salt, about sixteen Nitre, and the Rest common Salt. Between these Wells lies the blind Hole, which rises up all of a sudden, boiling up most impetuously, sends off a great stream of Water for several Weeks, then dries up of a sudden again, stream and all fails, the Ground is chap'd for several Weeks again; its Water is of the same Nature of the two last, it is the most unaccountable Spring in this County, and more surprising than the Ebbing or flowing Well near *Tiddefwall* in *Derbyshire*, for it has no Dependence upon Rain or Drought as the other has.

To these two petrefying Waters, we may add *Newton Dale, Ibberstone*, one near *Castle Howard*, the Seat of the right Honourable the Earl of *Carlile*; one near *Skipton*, with a great many others, of which my Limits will not allow me to write a particular History, another at *Kiddal* near the Seat of the Right Honourable Lord *Bingley*, and one near *Wormsley* the Seat of *Harvey, Esq*;

From the History of the dropping Well we see, *First*, that this like those of the same Kind of the warm Waters, proceeds from Limestone. *Secondly*, that it contains great Plenty of Earth, as appears both from Exhalation, and pouring it upon Solution of Sugar of Lead. *Thirdly*, That this Earth is of a very alkaline Nature since it Ferments with weak as well as strong Acids. *Fourthly*, That since the Water is so exceedingly beautiful, limpid and fine, this Earth exists in very small Particles and therefore very near to one another in the Vehicle. *Fifthly*, Tho' these Particles are so near one another, yet they act not upon, or are not within the Spheres of sensible Attraction whilst in Motion, but when the Stream is spread all over the Top and Sides of the *Isthmus*, from which the Water trickles down in large drops round it, then some Parts of this Earth adhere to the Rock, and the Rest fall down some upon Grass, Sticks, Leaves, Straws, &c. and leaves its Incrustation in that languid Motion. *Sixthly*, We see that not only Diminution of Motion, and draining off the thinner Parts of the Vehicle, but the Accession of the cold Season, is also necessary to the carrying on this Work of Petrefaction, since there is none of them made in the Summer, but all in the Winter, and the colder and stormier that is, the larger and firmer are the Petrefactions. *Seventhly*, Add to this, that it is also Necessary to this Work, that the vegetating Life and Circulation of the Juices in the Plants be at a stand or past. For in *March* I observed that little or no Petrefactions had happened to these Vegetables, which had retained Life, and Circulation in their Vessels, during Winter, as Grass, &c. *Eighthly*, But since the Water, and Sediment, and Petrefactions all contain a Salt in them, it is hence plain that the Earth alone is not sufficient to form those Petrefactions. *Ninthly*, This Salt being chiefly Nitre always, it seems that this is the fittest Salt for forming those attractive Bodies, and preferable to the other mineral Salts. *Tenthly*, Since all the Grounds about the dropping Well, and the Sludge in *Band* or *Bind* Well, abound with Sulphur, and the Petrefactions lose so much by burning in the Fire, these indicate to us the Necessity and Presence of a third Principle, viz. Sulphur. Since these Waters differ little

or

or nothing in Weight, (allowing for their fixt Parts) from common Water we have no Reason to suspect their great Impregnation with a mineral Spirit beyond other spring Water.

From which Inferences we draw the following practical Uses. *First*, Since these Waters contain so much small earthy Parts, they would therefore be very improper for Bathing, for those Parts might by Degrees get into and block up the Pores, and so produce abundance of Mischief to the Body by lessening or hindering Perspiration. *Secondly*, As these Waters like a Solution or strong Infusion of Japan Earth, or Bole, coagulate Milk and Soap, (which cannot be from their little Salt) this Earth seems of a rough astringent Nature. *Thirdly*, Since this Earth forms no Petrefactions whilst in a brisk Motion, or in a temperate Season, or on Vegetables whilst they preserve their vegetating Life, the Fear of their leaving Petrefactions in living animal Bodies is very ridiculous, and grounded upon neither Reason nor Experience, but a wild extravagant chimerical Opinion. Tho' I own an unreasonable long Course, and unconscionable Quantities of those Waters daily drunk, may so expand the Flood Gates of the Kidneys and Ureters, as to leave some small Sand or Gravel sticking to the Sides of the lesser or larger Pelvis, as of the Reins after a long Use of them; hence Sand and Gravel voided by and with the Urine; but this is the drinkers Fault only, and not that of the Waters. Suppose one should drink five or six Quarts of this Water daily for a Month (as was the Custom formerly in drinking mineral Waters) then he swallows about a Pound of this Earth, which being carried into the Body must be allowed a Vent somewhere, whereby Sand must be discharged. *Fourthly*, Since these Waters contain such an alkaline, astringent rough Earth in so very small imperceptible and impalpable Particles, it is certain no better Medicine in the World can be contrived by humane Invention for Hemorrhages or Fluxes of any Part of the Body, or Colliquations, or Dissolutions of the animal Juices of any Kind. For if these Disorders are from an acrid Salt dissolving the due and healthy Texture of the Blood and Juices, here is a very noble and efficacious alkaline to absorb the Salts and sweeten the Fluids, which will more than answer the Intent of the testaceous Powders. Or if the Sharpness and Saltiness of the Blood and Lymph, has shorn off and wasted some Part of the insides of the Blood Vessels, here is a fine small Earth to sheath up the Salts, and compensate the Ravage made upon the Solids and Vessels themselves, or where the Vessels are tender weak and thin, the secretory Ducts or Strainers widened, and pour off

off the Fluids in too great Quantity, here is an astringent earthy Matter, which binds up and strengthens the weak or dilated Parts. The Sulphur in the Water is at the same time drying, the Nitre cooling and gently stimulating, till it is changed by the Powers of the animal Oeconomy. *Fifthly*, Hence these Waters are of the greatest Use when the animal Secretions are too much encreased, seeing they cool and thicken the Juices, suppress too great a Fulness, strengthen and brace up the Vessels and Strainers. Therefore they cannot fail to be serviceable in all unnatural Discharges of Blood, whether by Spitting, Stool or Urine; or by excessive menstrual or Hemorrhoidal Fluxes in the *Fluor Albus*, Diabetes, profuse Sweatings, violent Fluxes of the Belly, whether Diarrhea, Dysentery, or Lienteria, where the natural Springs are not quite worn out, and the Body past all help. In Ulcers of the Viscera, hectic Fever, Atrophy and pining away of the Body, either insensibly without Pain or Sicknes; or by profuse colliquating night Sweats, or wherever thickening, healing, strengthening, sweetning, cooling and cleansing are indicated, I cannot conceive a more profitable and pleasant Method left in Physick to recover the Patient (if curable by any Means.) *Fifthly*, But then they are not to be gulped and swallow'd down in unmerciful Quantities, nor without any Preparation; the Use of these Waters is always to be preceded with Rhubarb once or oftener taken to cleanse off the Gross Excrements in the first Viscera, that the Contents of the Element may answer sooner. Three half Pints of the dropping Well is a sufficient forenoon Dose, and five half Pints of the *Band Well*. Their Use forbids all violent Exercise, together with any Kind of Diureticks or Purgatives which carry off the Water before it has done its Errand in the Body; and of all the Distempers I have named, the *Fluor Albus*, night Sweats and Astrophy will only allow of moderate Exercise. All Hemorrhages forbidding Exercise, except in some particular Circumstances which are only to be judged of by the Physician present. A Course of these Waters forbids the Use of Ale, Drams, Punch, white Wine, and made Wines, and very little if any red Port. A little red Port alone or with this Water may be allowed to those accustomed to Wine or spiritous Liquours; if any Success is expected from the Waters, a strict Regard is to be had to the Diet. Milk, Eggs, Gellies of all Sorts, Barley, Almonds, Rice, Panadoes, Chickens, and Chicken Broth, Kid, Veal, Lamb, are allowable. Of Fruits, Quinces or their Marmalade, Austere Apples or Pears roasted, Morella Cherries, Service Berries, &c. with other astringent, thickening, cooling Foods.

But

But all heating, sharp, salt stimulating Things must be laid aside, as Pepper, Mustard, Ginger, Onions, Raddishes, Shalots, Chives, &c. or Meats, wherein they are, whether fryed or baked. Cheerfulness, agreeable Conversation, Diversions that require not much bodily Exercise, are good and conduce to the Success of the Waters; Day Sleeps, and Night Air, are hurtful. *Sixthly*, But as these Waters are highly conducive and restorative of the Health of such as labour under the above Diseases, they are no less mischievous in those Distempers which arise from too great a Thickness of the Blood, Diminution of Secretions and Obstructions; hence they are not to be meddled with in Jaundice, Dropsy, suppress'd diminished or irregular *Menses*, Hyppo, Melancholy, stuffings of the Vessels of the Lungs, Obstructions of any of the Viscera, Costiveness, Stoppages of the Lacteals and Misentery, Lymphatic or glandular Swellings, Kings Evil, Schirrus, Hardness of the Spleen, or in any Case where thinning, relaxing, opening, deterging, Attenuation, Incision, or Stimulation are required. Let it however be remembered, for the Benefit of the Sick, that tho' the Earth in those noted petrefying Waters be all *Lapis Calcarius*, yet there is great Difference as to its Fineness and Coarseness, according to the Grain of the Stone through which it is strained, and all of it taken into the Body is of the Nature and answers the Design of the *Osteocolla* Stone in binding and strengthening, as well as of the testaceous Powders in absorbing and sweetning, and are all drying, yet they answer different Intentions according to the Smallness or Grossness, Smoothness and Roughness of their Parts. For such as carry in them a Coarse Earth, as the dropping Well, are most effectual in curing Looseness, Diabetes, or bloody Urine. But such as contain a very fine impalpable petrefying Earth, carry their Effects further as to the Lungs, for spitting of Blood or Catarrhs, or into the whole Habit, as Hecticks, Atrophies, colliquative Sweats, &c.

P A R T II.

Of the Purging Chalybeate-Waters.

THESE are *Scarborough, Malton, Aswarby, and Stenfield*, to which we add, *Orston, Retford, Walcote, Semperingham, &c.*

As *Scarborough Spaw* is of great Fame and Antiquity, and hath engaged many Pens in warm Controversies about it, I think myself obliged to begin my Observations here. The Name of the Place is *Saxon*, signifying a Burgh or Borough on a steep Rock; it sends out two Members of Parliament, is governed by two Bayliffs, two Coroners, four Chamberlains, and thirty six Burgeses, consisting of three Benches annually chosen. As to the Castle and its Government, you have the full History in *Vol. 6. Pag. 39, &c. of the Magna Britannia*. But still a more particular and just Account was sent us from an unknown Hand, which being very exact, please to take it in the following Words.

“ The Situation of this Place is very romantic, it bends in the Form
 “ of a Crescent to the main Ocean, of which you have an unbound-
 “ ed Prospect from all parts of the Town. The Town is built upon
 “ the Declivity, and almost at the Foot of a lofty Hill, on the top
 “ whereof stands a well fortified Castle, that hides its Head among the
 “ Clouds. This Castle from the Advantage of its Situation, has been
 “ the most impregnable Fortrefs in the Kingdom. The Town is walled
 “ and moted round, except where it joins to this Castle, or unbosoms
 “ to the Sea. The Castle is of a vast extent, towering upon a lofty
 “ Promontory to the East that runs far into the Sea. It overlooks two
 “ Stone Piers, that form a Harbour, which though very Capacious, and
 “ one of the most Commodious in the Kingdom, is yet scarce able to re-
 “ ceive the Ships belonging to the Place. There is an uncommon Re-
 “ semblance between this and the Bay of *Naples*, but the Cliffs upon
 “ which this Castle stands are of an amazing Height, so very high, that
 “ it serves for a Seamark to the Ships which sail from the Northern
 “ Seas, and is generally the first Land they discover. And tho’ the
 “ Castle is built upon the Summit of so steep a Declivity, yet within the
 “ Walls

" Walls you find a Plain of eighteen Acres of Ground, yielding a rich
 " and fertile Pasturage, with a constant Supply of fresh Water, so that
 " both Nature and Art combine to render the Place tenable against every
 " thing but civil Rage. This Fortrefs being of great Antiquity (for it
 " was first built by *William Le Gros*, Earl of *Albemane* and *Holder-*
 " *ness*, and fallen into Ruines and Decay again, was rebuilt and made a
 " Fort by King *Henry II.* about 1134.) It is curious to observe the
 " Openings contrived for the Shooting of Arrows against the Assailants;
 " the Places for Grates and other Conveyances, through which to throw
 " scalding Water and other ponderous and offensive Matters upon them,
 " with the Draw-bridges, the Watch-towers, Battlements, and other
 " Devices of Fortification. The Buildings here are numerous, uni-
 " form, neat, regular, large and commodious; it is not easy to furnish out
 " a more magnificent Scene, or to gratify the Imagination with a more
 " pleasing Prospect than what we here receive from the Immensity of
 " the Ocean. The sight of that vast Expanse or Abyſs of Waters,
 " which often appears loaded with such a Number of Ships, that it
 " seems to groan under the Burden. The Tide looks as if the Waters
 " were expanded and pressed wider by the floating Castles upon it, they
 " appear to the Eye of the distant Beholder, like a Forest of stately
 " Oaks, or lofty Cedars, as if it were to familiarize the Wonder of
 " moving Woods. The Recess of the Sea leaves a beautiful Parterre, or
 " spacious Area upon the Sands for two Miles, the whole as level as a
 " Bowling-green, and at such times, all sorts of sprightly Exercises
 " and genteel Diversions go forward there. The Town is Peninsular,
 " and almost environed with the Ocean; if you turn from the Sea, your
 " Prospect is every where bounded with high Hills. The adjacent Coun-
 " try affords a beautiful variety of verdant Meadows, fruitful Plains,
 " and pleasant Groves. But towards the Sea, surely the Face of Na-
 " ture no where makes so Grotesque a Figure; it is here the Scene be-
 " comes agreeably diversified, it is here you find unexpected Contrast,
 " here you find Meads among Rocks, and Rocks among Meads, gloomy
 " Caverns, and rising Towers. The refreshing Gales from the Sea,
 " with the Shade offered by the Mountains, give a most agreeable Tem-
 " perature to the Air, during the sultry Summer Heats. The frequent
 " Breezes entirely dissipate and dispel those noxious Vapours which of-
 " ten happen where the Air is stagnant, and produce such a Sereni-
 " ty, as is not to be paralleled in the more inland Parts of this Cli-
 " mate."

The Spaw Issues from the Bottom of a large Cliff, about a quarter of
 a Mile South of the Town, from which is a steep Descent, and then
 long

along the Sands till you come to the Spring, whose Water, fresh taken up, is extreamly clear and transparent, has a very quick and pungent Taste, and leaves a pleasant Flavour upon the Palate. The ingenious Dr. Robert Witty, then of Hull, was the first that favoured the World with the Discovery, Nature, and Uses of this Spaw. * He lived cotemporary and in great Friendship with Dr. James Primrose Physician there, and

* *Scarborough Spaw*, or a Description of the Nature and Virtues of the Spaw at Scarborough 1660, May 29. Our Author having described the Scituation, Signification, Rarities, and Government of the Town, comes to the Spaw, which he says was discovered about 1620, by one Mrs. Farrow, a Charitable and Physically disposed Gentlewoman of good Repute, who lived in the Town, and sometimes walking that way, observed the Stones in the Water-courfe of a Russet Tincture, and finding the Water have an acid Taste, different from common Spring Water, and observing that Galls gave it a purple Colour, she imagined it had some medicinal Qualities, and both drank of it herself, and advised her Neighbours to it, and found it opened the Belly, strengthened the Body, and cured some Distempers. Thus it first became the common Physick of the Inhabitants, then it quickly gained Reputation in the Neighbourhood; in few Years its Fame reacht Hull, after that our Author went yearly to Hull, and carefully informed himself of the Nature and Effects of the Water on its Drinkers, often recommended it to his Patients in sundry Cafes. Then the Citizens of York and Gentry both of this and several other Counties, being apprized of its Worth, resorted to it; and several of those who had drunk the *Italian, French, and German Spaws*, preferred this to them all, for its quick and easy Passage by Stool and Urine. Then after his own Tryals and Observations for twenty Years, he communicates them in his first Treatise, which he from time to time enrich'd with fresh and more digested Materials at each Edition.

This Water, he says, partakes of Iron, Vitriol, Alum, Nitre, and Sea-Salt; it is very clear and transparent, somewhat inclining to a Sky Colour, has a pleasant acid Taste and inky Smell, a Pint of it put to a Pint of boiling Milk crudled it presently, and made a very clear and pleasant Posset-drink. Galls turn it instantly to a claret Colour, or like Syrup of Violets mixt with Water, with a few Drops of Spirit of Vitriol. After the Gall has been some Hours in it, it turns it so black and dark that one cannot see the Bottom of the Vessel, but if you take up the Vessel softly, and set it down again with a Knock on the Table, so as to break the minute Parts of the Water, a blackish Sediment soft to the Touch falls to the Bottom, and the Water becomes clear again, and may be separated; some Quarts of this Spaw Water leave not above two or three Spoonfuls of this Sediment, which evaporated, leaves a blackish sharp Powder, which he takes to be Iron, or Iron vitriolated. And this he often used in Medicine with surer and better Success, than any preparation of Steel in the Shops, being more aperient, especially when Vitriol was added to it. Every five Quarts of this Water contain an Ounce of the above five Minerals. But in a dry Summer, he found the Proportion greater, whether they were extracted by Distillation or Exhalation. When the Water was gone, the Powder laid at the Bottom, like parched Meal, somewhat bitter, salt, sharp, styptick, and of an ash Colour, but easily separable from the Skillet. But in his first Edition he could only obtain three Drams of Sediment from three Quarts of Water. He filtred other three

and the great Antagonist of the Immortal Dr. *Harvey* who discovered the Circulation of the Blood. After Dr. *Wittie* had continued at *Hull* eighteen Years, he removed to *York* about 1656. from whence he favoured

three Quarts and boiled a while, then discovered a reddish Sand at Bottom (the same with that which falls to the Bottom when the Water is tinctured with Galls) he took the Skillet off the Fire, poured the Water into another Vessel, the Sand remaining he found was a Dram, soft and not sharp, which he thinks is Rubric, or vitriol of Iron, it was of a stiptic, not salt Taste. The *Mater Ferri* thus separated, he set the Water on the Fire again, scummed it carefully, and at the Bottom was two Drams of a whitish Sediment, bitter and sharp to the Taste, when the Water was almost evaporated, it rose up in *Bulla's*, making a bubbling Noise, like the boiling of the Alum-works at *Whitby*, from which, and the firm Attachment of its Sediment to the Skillet, he will have it to partake much of Alum. When he had laid those extracted Minerals some time in a cold and moist Place, the salts crystalized and appeared like Isicles, which is the Form of Nitre, and this next to Alum, he takes to be the predominant Mineral in those Waters, then Vitriol, then Iron, and lastly Salt. Nor can he imagine how these Minerals could be better separated, or more clearly demonstrated.

But he has also other Reasons besides these, which induce him to think that these are the Minerals wherewith these Waters are impregnated, as, 1. For Nitre, at the Bottom of the Rock from which the Water rises, there is much Nitre, which discovers itself in Veins all along, but especially within eight Yards of the Well, where in hot dry Weather it sweats out, and is white as Snow. 2. For Iron, there are many Stones of Rubrick, besides much of the Earth that falls, being washed down by the Sea, turns to Iron-stone, hard as Iron itself, and fusible in a Smith's Forge, which he tried. Within a hun-

dred Yards of the Spaw, is a Piece of a Cliff converted into Iron-stone within a few Years. 3. In the Cliff and Rock thereabout, is abundance of Alum-stone. 4. The deep Tincture wherewith Galls strike this Water, beyond any other he has known or read of, shews it to partake plentifully of Vitriol, which unites itself with all the Minerals inseparably, for whatsoever way you extract them, the Acidity is very predominant, and he alleges that the Waters plentiful Imbition of the esurine Spirit and Salt of Vitriol, makes it more largely corrode the Tincture of the other Minerals through which it passes. 5. He thinks it borrows the Salt from the Sea, wherewith the Spring is sometimes overflowed, for he finds no Marks of fossile Salt thereabout. He denies not but there may be some other less discoverable Minerals in those Waters, but he contents himself with the most conspicuous, and leaves the rest to more curious and trifling Examiners.

This is the Case at the Fountain, but when it is carried to some Distance, there is a loss of Minerals, according to the Length it is removed, especially if taken in Oak Barrels, at whose Bottoms subsides a yellowish Sediment, not unlike *Crocus Martis*, of a stiptic Nature, supposed to be the Chalybeate part of the Water, separated by the Vessel and Agitation of the Liquor in Carriage. Sir *John Anderson* of *Broughton* in *Lincolnshire* first observed this; and at his House, which is only forty Miles distant, it would not curdle Milk as at *Scarborough*, nor did Galls give it such a deep Tincture, nor had it so grateful an Acidity. Which he supposes is from the loss of its vitrioline Parts, which being more subtle than the rest, are evaporated. This Well he says sends out about twenty four Gallons of Water in an Hour. From Section
T First,

favoured the World with the first Edition of his Treatise on *Scarborough* Spaw in 1660, May 29, the Day of the Restoration, this was soon followed by several others before the Year 1678, when he enlarged it,

First, He is upon Water in general and particular, the Origine of Springs, the Cause of Rain, Hail, Snow, Dew, Flux and Reflux of the Sea, and the Reason of its Saltnefs.

Section the Twelfth, He reassumes his Thread of Discourse on Mineral Waters, whereof *Agricola* reckons up six simple Sorts, viz. Salt, Nitrous, Aluminous, Atramentarious, Sulphureous, Bituminous, and *Scarborough* Spaw, which is a Mixture partaking of several of them.

The manner how Waters imbibe the Virtues of Minerals is, 1. By receiving its Vapour, thus Water let stand in a Brass, Copper or Iron Skillet some time, tastes of the Metal. 2. By some of its Juices being dissolved in the Water while the Mineral is yet in Embryo. 3. By Corrosion of the Substance of the Minerals, whose embryonated concrete Juices are dissolvable in Water, especially where there is Vitriol. 4. By Confusion, changing the Substance of the Mineral into Water, this is done more quickly if the Waters have imbibed a vitrioline Juice.

The Production of Mineral Juices, some have imagined to be created perfect at first, seeing we have no manifest Seeds of them, as of Animals and Vegetables, neither are their Substances fluxible, but firm and permanent, yet subject to decay in time, therefore must they be repaired and preserved by Generation, for as the Seminaries, and not the perfect Plants of Vegetables were created at first, so Minerals were only in Embryo at first, because Moisture is as necessary for the Production of the last as of the first, therefore all Philosophers are agreed that Minerals and Metals are generated, and Experience proves that Mines of Salt Petre, Alum, Tin, Lead, Iron, &c. when they are wrought out, will in a certain Number of Years repullulate and generate their Minerals again.

Scarborough Spaw is impregnated with its Minerals all the above four ways, according to the Nature and Capacity of each Mineral. It receives the Vapour of Vitriol and Iron, yet so as it hath something of the concrete Juices of both. It has its azure Colour from the concrete Juices of Vitriol, Iron, and Alum. It is plain it has Iron, for being either boiled or put in Oak Vessels for some time, there appears a reddish Sand inclining to yellow, which is only *Mater Ferri*, or Rubric, and this is discoverable by putting a little Powder of Gall to it. Lastly, Nitre, Salt and Alum, being dissolvable in Water, are mixed with it, as I have proved.

Next comes he to treat of his five Minerals discovered in those Waters, viz. Vitriol, Alum, Iron, Nitre, and Sea-Salt, and gives their Differences and Uses. He says there are three Sorts of Vitriol, viz. Roman or Copperas, Cyprian or Blue, and a kind of Blackish found in *Liguria*. Vitriol is hot, biting, and of an adust Quality, and yet stiptic and adstringent, and therefore dries up Humidities; it is used in Diseases of the Eyes, and all moist Distempers; stays Bleeding, provokes Vomiting, kills and expels all sorts of Worms, but mixt with Water, all its Qualities are more moderate. Iron is dry in the third Degree, it is also stiptic, somewhat like Vitriol, good against all moist Diseases, especially of the Belly and Uterus, strengthens the Seminal Vessels, opens Obstructions of the Liver and Spleen, discusses their Swellings, strengthens a weak and relaxed Stomach, is good in Dropsies; Iron and Brass joyned are more Purging and Opening, hence most of the vitriolic Waters in *England* loosen the Belly. Of Alum *Galen* reckons up three Sorts, and says they are all of gross Parts and very stiptic, astringent, healing, and something corrosive, it hinders the Generation of Ulcers, stays

it, and put it forth in *Latin*, having diligently attended the Place for most of thirty-six Summers, laid in a Stock of valuable Observations on

stays Female Fluxes, is used in drying Medicines, &c. Our Spaw proceeds from a nitrous Mineral within the Earth, else how should it enlarge so great a Quantity as a Dram of Nitre, to three Quarts of Water only. He says Nitre is of two Sorts, natural and Artificial. *Serapio* says, the first is reddish, *Galen* says he has also seen a white Sort, but all agree that Nitre is drying, digestive, absterfive, and resolving, cutting gross and clammy Humours very strongly; its Taste is between Salt and Sowre, inclining to Bitter, it corrects the Sharpness of Urine and Ulceration of the Bladder from Cantharides, and cures the Poison of Mushromes. Salt is either Rock Salt, or Marine, the first is more gross, earthy and compact than the last; yet both are deterfive, cleansing, resolving, purging, drying, kills Worms, preserves from Putrefaction, &c. The Minerals in this Water are not yet arrived at their state of Perfection, nor never will, but remain in an imperfect state in the Waters, yet so as in many things they agree with, and ought to be preferred to those already in Perfection, tho' they do not exactly correspond in every thing. Hence they have their Taste, Colour and Smell from Vitriol, yet excite they not Vomiting, except from a Weakness of the Stomach, or the Drinkers Indiscretion in pouring down too large Quantities. But from the Iron and Vitriol the Water is grateful to the Stomach, strengthens its Tone, and raises the Appetite. From the Nitre it resolves, absterges, cuts gross Humours, is proper in Nephritic Pains, cleanses Kidneys, Ureters, and Bladder, from Stone, Sand, and fabulous Matter. It is the Nitre that Crystalizes. From these three, and Salt, it has its purgative Quality, and that without either Pain or Gripings. The Allum added to these, makes it Stiptic and Astringent; hence he has known it cure Superpurgations, and

is successfully used in several Female Disorders from superfluity of Humours; and indeed after fifty Years sedulous Observations, and the repeated Experience of a thousand Drinkers, it is certain that this Water may safely be drunk by all Ages and Sexes, by Women either with Child or not with Child, and in Diseases of the greatest Difficulty, which have resisted the most judicious and experienced Practise; nor can *Europe* produce a more pleasant Spring, or one that will answer a greater Variety of Intentions, let them be never so famed. Tho' he would not be here supposed to recommend it to every individual without any difference of Safety, Preparation, Doses, or Regimen.

He next asks the Question, and resolves it in the Affirmative, *viz.* Since five Quarts of this Water, containing one Ounce of the Mineral Salt, besides Spirits, and the usual Dose to the Drinkers is three or four Quarts every Morning, whether it be safe for the Drinker, to have such a Portion of them pass every Day through his Body? And tho' it be so safe and innocent, that none in *Europe* does better suit general Indications, yet it cannot be expected to cure all Diseases, nor is it safe for every individual Person to drink such Quantities of it, without previous Preparation, and suitable Diet with it; for want of which, to save Charges, he has known several miscarry, and blame the Water for their own Fault. As some worn out by chronic Distempers, and a long Journey, have died before they have drunk two Quarts of Water in a Week. Others coming with full scorbutic Habits of Body, have without any Preparation or Advice, swilled down prodigious Quantities, and fallen into Gout, or other arthritick Pains. Others who never had the Stone, tho' Hereditary to their Family, coming there, have fallen into a severe fit of the Gravel. Others liable to a

on the Nature, Variation, and Effects of the Water, in what Cases and what Constitutions they had, and were most likely to be serviceable, hurtful,

Diarrhea, drink it to such Excess, as occasions a Super-purgation, and died for want of good Advice, and the Water killed them be sure. Another Query is, Whether might not the mineral Salts extracted from the Water, answer all the Intentions of the Water, whether given alone or in the Water, in as high a Degree, and eminent a Manner, as a Course of the Water it self? To which he returns Answer in the Negative, 1. Because he has found upon several Tryals, that these mineral Salts are indissoluble in Water. 2. Because it is the Nature of Salts to heat, dry, and astringe, and this Nature they had not before. 3. Because the Water in Evaporation loses its volatile and spirituous Parts. 4. Because it would be an endless Toil to extract so much genuine Salt. 5. Because there may be some Qualities in the Mixture of those Principles which we may suppose lost in torturing them, or they may acquire a Nature very different from what they had.

This Spaw has this in common with other Water, that it cools and moistens the Body, quenches Thirst, but being impregnated with the above Minerals, it is hot and dry in Operation, therefore corrects cold and moist Bodies, and cures Diseases arising from an Excess of these. Tho' this Water be actually cold and moist, but potentially warm and dry, yet these its contrary Qualities being so moderate, that we are not to expect a forcible Operation from any of them, therefore fitter and stronger Means may be used to any of those Intentions. This Water is of thin penetrating deobstruent Parts, it attenuates, incides, dissolves, deterges and evacuates both by Stool and Urine, yet so plentifully both ways, as tho' all the Humours went but one way, without any Pain or Gripes. He one Morning drank three Quarts of the Water *facta prius Retrogradatione*, then weighed himself before he drank the Water, that

he might better judge what Alteration it made on his Weight. He drunk a Pint every half Hour, and kept walking about; when he had drunk three Pints, it began to work both ways; within eight Hours he had seven Stools, within five Hours he made a Quart of Urine within half a Gill, clear and without smell or taste, he evaporated the Urine, but nothing remained, except a filthy mucous Sediment of a sandy Colour. This is a speedier Evacuation than is done both ways, by any Mineral Water in Europe. Next Morning he weighed himself again and had lost two Pound and a half, but was more nimble and brisk than before, whereby he thinks it strengthens the Body, and yet unloads it from the remotest Parts, but every one must see the insufficiency of this Experiment.

Section 13. He enumerates about thirty remarkable Cures which he had observed in sundry Diseases, from the Use of this Water, and recommends its Use in nineteen more either from Observation or Reason, but Histories of Observations, mostly taken at Random, without the true History of each Disease, its Causes, Nature, and Effects, and no Account what things had been helpful, hurtful or indifferent, whether given accidentally or designedly; nor have we the clear Symptoms of the Illnesses pointed out to us, whether particular or common, in their due Order and Degree, nor what happened to the Patients by things ingested, egested, retained, or excreted, &c. I therefore pass over these Histories, and content myself with a bare naming of the Diseases wherein he had seen it serviceable in forty Years Experience and Observation; tho' I own we have no Histories of that time to exceed his.——In a scorbutic Habit with Pain in the Joynts, and shortness of Breath, succeeded by the Gout. In the same Habit with a Bleeding at the Nose, or with a Heat of the Bowels, Shortness of

hurtful, or indifferent to, then maturely reviewed and examined the whole, and published it as a general and lasting Legacy, both to his Country-

of Breath, and Pain in the Knees. The Water is good in several Diseases of the Head, from Disorders of the Stomach and lower Belly, in Convulsions either from bilious Humours in the Bowels, or Worms. In scorbutic Palsies, Megrim, Vertigo, cold Sweats, intermitting Pulse, and universal Weakness after a Fit of the Palsy. In Convulsions and Dimness of Sight from a Palsy. In the Epilepsy from hot Vapours darted from the Hypochondria into the Head like Flashes of Lightening. But remember this, that if the Palsy, Epilepsy, Vertigo, or other Diseases of the Head be Idiopathic, or originally in the Head, or suppose they are from Sympathy, these Waters are improper and not to be depended on in the beginning or State of the Disease, while the Animal Spirits are dull, and the Humours fixt, but Recourse must be had to more forcible Remedies, till the Disease comes to its Declination, then the Waters, along with Medicines suited to the Case are of special Use to perfect a Cure, if the Patient will be regular. It is also good in Asthmas and stuffing of the Lungs, provided they are not ulcerated, nor the Body too cold, feeble and aged. It is serviceable in Rheums and Catarrhs, in the Gout, Inappetency, Indigestion, Vomiting, Belching, Heartburn, Surfeits, inveterate griping Pains in the Stomach, or fixt acute Pains with Distention, Induration, and a bending of the Ribs. In the Jaundice and Vomiting succeeding a tertian Ague, caused, by first, the small Pox, then a severe Fever, and with Child all that Time, which must be owned to be a difficult Case. In inveterate Obstructions of the Mysterium, Liver and Spleen, tending to a Dropsy, or even in a begun Schirrouisness of the Parts; but if the Dropsy or Schirr be inveterate, the Waters must either be refrained totally, or their Use preceded by proper Medicines. In Scurvy and Cachexy joyned, if drunk at the Fountain; for if the Water is car-

ried and kept, it weakens the Stomach and turns the Body yellow. In obstinate intermitting Fevers, if drunk in the Absence of the Fit, or it is serviceable to purge off the Dreggs of small Pox, and Agues. It has surprizing Success in Hyppo and Hystericks. It kills all Sorts of Worms and expels their Nests. In Inflammations and Ulcerations of the Kidneys; in the Stone, Gravel, Dysury, Strangury, &c. except there is a large confirmed Stone in the Kidneys or Bladder. It is singular in carrying off the Remains of a Gonorrhæa, and the Dregs of Mercurial Courses, or to cure bloody Urine; and also in many uterine Diseases, as Hystericks, *Chlorosis Fluor albus, aut Menses nimii*. It cures Barrenness, prevents Abortion, it is good for Children of five or six Years old, strong old People, or Women with Child in their middle Months, if some Indication forbid not.

Section 14. Contains the Rules previous to, during, and after a Course of those Waters; such as are in Health, and need no Preparation before, let them only take heed they drink not too much before the Water begins to work, which will be in four Hours Time; and even to them it may be of Service to remove beginning or latent Obstructions, and in expelling Humours, which by lying in the Body might be the Seeds of Diseases. But the sickly must not forget to have the best Advice, their Bodies must be prepared according to the Nature of the Distemper whether simple or compound, the Age and Constitution of the Patient, the Parts affected, and Stage of the Diseases; and to know whether the Water is suitable to his Case, and will answer his Expectation: But a Set of Particular Rules can only be given by the Physician on the Spot, for some must first have a Course of Apperients and Purges when the Obstructions are rebellious, Humours tenacious and Nature dull; for the Water has been singularly useful in the above mentioned Cases, yet it was not

Of the Purging CHALYBEATE WATERS.

Countrymen and Strangers for future Ages; but from this very Case, we see neither Ingenuity, Diligence nor Humanity, can screen and preserve

not used alone, but had the Preparations and other concomitant Assistants of other Medicines. Sometimes in full Bodies and hot Distempers, bleeding is good. They must begin gradually, and drink two half Pint Glasses of it about six a Clock in the Morning, and either ride or walk half an Hour till that is somewhat gone off the Stomach; then drink another Pint and walk about, till they have drunk four or five Pints for the first Morning, except the Body is weak (then less will suffice) lest it cool the Stomach too much and cause vomiting. If the Water has cleared its Way the first Day, he may venture on three or four Pints more next Day, and between every two Draughts, let him chew some Stomachic or Carminative, or swallow their Powders to warm the Stomach. They must be sure that they have drunk their full Dose by nine or ten of the Clock at farthest, that it may work off before Dinner, which they may know from the Urine turning of a higher Colour; such as cannot walk to the Spaw, may drink it in their Room, or if they please, air it a little before the Fire. Their Diet here must be sparing; Salt Meats and Variety of Sea Fish must be avoided, and such as eat of the last, should drink a Glass or two of Sack or Claret after it. Salads are also very improper here, breeding these very Diseases which they expect the Water should cure. He thinks it not adviseable to drink the Water in the Afternoon, because it keeps the Body too open, hurries the Meat too soon out of the Stomach, may disturb the Patients night rest, occasion Gout or some other Arthritic Pains. He discharges Afternoon Sleeps, but advises to Riding, Bowls, or some other Exercise. If the Waters swell the Body and go not off, a Purge may be given, or a purging Glyster injected. The Time they are to drink these Waters must be suited to the Obstinacy of the Disease,

and the Patient's Strength; for Melancholick, gross and full Bodies, require longer Time than thin Bodies, which are readily moved. But in obstinate Cases, rather than continue too long at a time, it is better at a Months End to leave off the Water, and return to their ordinary Diet and State of Life, and then apply himself to the Water again; and when one Course would not do, he has often observed this Method effectual. But if a Man once finds Relief from the Waters, and then begins to decline in his Health, his Appetite fails, the Water goes not off as before, but his Belly and blood Vessels swell, he is Asthmatic, or has a Pain in his Head, it is full Time for him to desist for that Season, and take to Exercise, and that failing to apply to a Physician. The fittest Season for drinking is from the first of *May*, to *September*. For during the Summer, the Water is stronger of the Minerals, great Rains weaken it much; indeed in a hard and strong Frost, the Waters are as strongly saturated with the Minerals; but except in Cases of Necessity the Coldness of the Season favours not their Use. 2. The Passages of our Bodies are more open and passable in Summer than in Winter, so that the Water goes better off. 3. Our Bodies being dryer in Summer, we may drink more plentifully, Roads are better, Days longer, and travelling pleasanter. Here he Answers the Objection against Purging in the Dog Days, saying it is not forbidden from the Influence of the Star, but the usual Heat of the Sun at that Time; besides Astrologers agree that there are many other Constellations of greater Malignity to human Bodies than the Dogstar, as *Scorpio*, *Caput Medusæ*, the Dragons Tail, &c. neither is our Climate so hot as theirs at *Coos*, now called *Sango*, near *Rhodes*. Such as are necessitated to drink it in Winter, must warm it, walk about in a close Room,

serve us from the Envy and Hatred of the Malevolent; for this kind and generous Undertaking, and Performance, stirred up very warm, but weak and unequal Adversaries against him, which drew him into a long Controversy in the Declination of Life. The first attack he had was from *William Simpson* Batchelor of Arts, * who set up to practise

Room, well aired with a good Fire. This Water loses much of its Virtue both by carrying and long keeping, comes short of its Taste, Purity and Operation, tho' it will purge, yea probably after it is become fetid, but then it spoils the Stomach. He never heard of one remarkable Cure done by it at a Distance, therefore advises all that want it to repair to the Spring. Thus we have a short but full Abridgement of what concerns the Spaw in this Book.

* *Hydrologia Chimica*, or Chymical Anatomy of the *Scarborough*, and other Spaws in *Yorkshire*, with Animadversions on Dr. *Wittie's Scarborough Spaw*, and a Description of *Malton* and *Knaveſburgh Spaws*, &c. London printed for *Richard Chiswell*, 1669. By *William Simpson*, *Philo-Chimico-Medicus*.

Allowing the five Principles which Dr. *Wittie* will have in this Spaw, and from which it receives its Virtue, yet he has left us in the Dark, whether his first, viz. Vitriol, be that of Iron and Copper; for if the first, then is one of his Principles superfluous, the Iron being the metalline Part of the Vitriol, which is the esurine Salt dissolved in the subterranean Veins of a Spring. If it is the Vitriol of Copper, then must the Operation of the Water be emetick, for the Body of the Copper being dissolved, becomes desperately vomitive, and can scarcely be separated from the esurine Salt which has seated itself thereon; or if it were the last, the Iron would by their mutual Embraces be tinged, and almost changed into Copper. Again, If the esurine Salt dissolved in the Water meet with a Vein of Copper in the Earth, it frets and dissolves it, and at the same Time that Acidity is coagulated upon the Me-

taline dissolved Parts, and both come together in the Water, in an indissoluble Nexure, when the esurine Acidity is terminated, and can act no more, tho' it should meet with Iron, having lost its fretting Power. Again, Iron cannot be dissolved and appear in the Form of a Liquor, without a dissolvent or Menstruum; thus we reject both Vitriol and Iron from any Part of the *Compositum* of this Water. And as to the sundry Kinds of Vitriol we allow that of Iron, Copper and white Vitriol, the second admits of great Variety; but it is merry to think that the Dr. will have Colcothar to be a third Kind of natural Vitriol, and that it turns Iron into Brass or Copper, there being no such natural Metal as Brass, nor its Vitriol. And as to the Ways whereby Water imbibes the Virtues of Minerals, we reject all his, and substitute in their Room only that by Odour; for ripe Minerals send forth no Vapours, no not by Decoction, Dissolution or Confusion, therefore again we dismiss Iron and Vitriol out of this Water. An ingenious Friend of ours, a chymical Apothecary in *York*, put some of the Sediment in Spaw, given him by Dr. *Witty*, in a Crucible, and set it in a strong calcining Fire for three Hours, without the least Alteration or Appearance of Colcothar, Vitriol, or Crocus of Iron; it still remained fixt, but was whiter; then he took it out, dissolved it in Water, filtered and evaporated it, and had a pure white clean Salt, with a little insipid ash-coloured Earth left in the *Caput Mortuum*. And as to the Quality of the five simple Minerals, which the Dr. will have to impregnate this Water, we cannot allow Vitriol for a simple Mineral Salt, but it is compounded of those Ingredients which must

practise Physick first in York in Opposition to Dr. Wittie, whom he used very unlike a Gentleman, but missing of his Design there, he removed

must necessarily go to its natural Genesis, therefore we cannot tell its Virtues before it is anatomized and each part known; nor can we admit Iron to be drying and stiptick, but it precipitates the *Tartarum resolutum*, or *Sal excrementitium*, which had fastned it self in the Bowels of the Spleen and Liver, &c. Allum is another of the Doctor's Ingredients, but he allowing several Sorts of it, and not telling us which of the three impregnates this Water, has left us as much in the Dark as ever; only he seems to mean the Dyers fictitious Alum, made of Alum-stone, Urine, Salt, and Kelp. Nitre is the fourth thing in this Composition, but tho' He allow two Sorts of it, yet has he not told us which of the two this is, but instead of both gives us the Virtues of artificial Salt-petre. His last Ingredient is Salt, which, if there, would be discoverable from its brackish Taste; but that being not perceptible, we conclude it an imaginary Principle as well as the other four; and therefore dismissing all five, we go to the Spaw itself, with a Solution of the Doctor's five Principles ready prepared, and give him a publick Challenge to make an artificial Spaw Water, with all five. He refuses to accept of so unfair a Challenge, alledging that his Minerals were natural, but ours were altered, having passed the Fire; we say they are only bare Solutions of the Mineral Ingredients, made without any stress of Fire, and very fit for Experiments; he however declined trying: I called for a Porringer of the Water, and put some Drops of Solution of Iron in it, which made it taste like *Knareburgh* sweet Spaw; a Solution of Nitre and Salt altered not its Taste, and a Solution of Mineral Alum put to them, brought it not near the Taste of the Spaw, nor did an addition of Vitriol amend it. A Solution of Galls put to the Mixture, made it quickly thick and muddy like Ink,

because of the Alum and Vitriol, but Spirit of Vitriol cleared it again. We also put a little clear Solution of Powder of Alum into one Porringer, and Spaw Water in another, an Infusion of Galls put into each, turned both of a deep Purple Colour; a little more Infusion of Galls added, they became black and dark almost like Ink, whence it is evident that purple and dark Colours are producible from other Liquors than Vitriol and Iron, as the Doctor imagines. Spirit of Vitriol cleared both these Mixtures. Hence we conclude there is a great Similitude between Solution of Alum and Spaw Water; but to those Solutions, cleared with Spirit of Vitriol, we put some Oil of Tartar, which made them almost as black as Ink, but cleared them again with more Spirit of Vitriol; Salt of Hartshorn turned both confused and muddy again, so that the Spaw Water and Solution of calcined Alumstone, admitted the like Precipitations, and the Solutions by Acids and Alkalies. Then we took fresh Spaw Water, and a Solution of calcined Alumstone, and poured Oil of Tartar into both, which caused a whitish curdling Precipitation, both were cleared alike soon by Spirit of Vitriol. Now let us Philosophize upon these Precipitations and Dissolutions; and here a Friend of ours informs us, that upon a Quantity of Spaw Water, he poured some *Lixivium* of Tartar, which caused a great curdling Separation of a whitish Matter, which after some time standing fell to the Bottom, the Water poured off, and this dried to a Powder, it was a white and insipid Calx; by which it is plain that the Salts of the Spaw and *Lixivium* were dissolved together in the restagnant Water, and let fall to the Bottom only the *aluminous Powder*, which the Acidity of the Water had dissolved in itself, and that without the least Perception of either Vitriol, Iron, or any

moved from thence to *Wakefield*, and some Time after, from that to *Leeds*, where he spent the rest of his Days, and published several Things.

any other Ingredient. From these Experiments we would prove against the Dr. that this Spaw consists only of a common Water impregnated with an aluminous Salt, which from a mineral Acidity had dissolved only a slight Touch of the Mineral of Iron, and therefore reject the Nitre, Salt, and Vitriol. The Loss of its Mineral Spirits, upon Carriage in Oak Vessels to distant Places, is not from Evaporation of Vitriol or vitrioline Spirit, but from a Quasiation of Parts, which in wooden Vessels admitted of incipient Putrefaction, whence an Inversion of Parts and Alteration of the Texture of the Water, and a Precipitation of Parts from the Oaken Vessels. Then we offer to prove from sundry Arguments, that there is no Vitriol in the Spaw, chiefly because it is not emetic, even to him who for a Fortnight together drunk eighteen Quarts a Day. We deny also that there is Nitre in it, for 1. Tho' the clear Water be poured off from its Sediment with the Galls, and set on the Fire till there is a Separation of a whitish crudling Matter, then take it off the Fire, let it stand to cool, and there will be a whiter Precipitation than before, from which pour off the Water, and the Precipitation tastes like Nitre; yet after the Precipitation by the Galls, the decanted clear Water receiving an Alteration by the Fire, began to make a spontaneous Separation of part of its Contents, which we look upon to be of the same Nature of the Sediment which remained after boiling up the rest of the Water. The Doctor apprehended Taste consisted only in the Flavour of his imaginary Principle, for many Solutions on the Fire give a Separation of Parts, which are but of the same Parts with the Residuum after Evaporation. 2. Tho' there is Nitre found upon the Cliff or the Rock where the Water springs up, yet it is generated by the Air, and is

only to be found superficially, as in old Walls, therefore called *Nitrum murarium*.

3. Tho' by exposing the Sediment or Minerals in a cold moist Air, there have been Crystals like those of Salt Nitre, yet the aluminous Body being of the same Nature with the Alum in the Cliff, its Particles attract one another, and gather the Nitre floating in the Air, which settles upon proper magnetical Bodies. The Doctor will have Vitriol in the Water, 1. Because it loses its Spirit by Carriage, which he therefore will have *Vitriolic*. He also imagined that the Water would lose its tincturing Property with Galls, tho' hermetically sealed up; this we tried once, and when it began to putrefy we broke the Bottle, and the Water tinctured with Galls; the same we tried a second time, but it did not do. We let a Bottle of it stand open, and it lost its tincturing Power in two or three Days; therefore it is plain from the first Experiment, that there is no loss of any volatile Parts, therefore not of Vitriol, but only an *Apporrhea mineralis*. If it had a Spirit, he should have set to the Distilling the Water to have caught it, but his Tools were very mean, viz. a Skillet and culinary Fire. I told him if there was Vitriol there, it would Vomit; he said he often gave Spirit of Vitriol in his Cordials, but it never vomited; I replied, because it was stripped of its colcothar, but had he given both together it had certainly vomited. As to Nitre he was sure it was there, for put some Galls into the Water, let it stand till it precipitate, pour off the Clear from the Sediment, set it upon the Fire, and there will be a Separation of a whitish crudling Matter; take it off the Fire, let it stand to cool, and it will let fall a whiter Precipitation than the first; this tastes like Nitre, the rest of the Water boiled away, affords the rest of the Minerals. But I say, that after the Precipitation

Things. He assumes the Title of chymical Physician, or a lover of chymical Physick; but he was too young and raw a Scholar to attack

tation by Galls, the clear Water receiving an Alteration from the Fire, began to make a spontaneous Separation of part of its Contents of the very same Nature of that which remained after Exhalation; and as to its Taste it was only because he would have it to be so. 2. The Doctor will have it to be Nitre, because of the plentiful Exudation of this Salt from the Cliff; but I say this is only superficial, generated from the Air, and therefore affects not the Water. And as to the Stress he lays upon his crystalized Icicles in the Sediment, this will not do, for the aluminous Body in the Water, is of the same Nature with that on the Cliff; for by the Sediments standing it attracts the floating Nitre in the Air. The yellow Earth which lies here in Veins, infused in Water and filtered, the Liquor turned Purple with Galls, white and precipitated with Oil of Tartar and Spirits of Hartshorn, but Spirit of Vitriol cleared them both again. Some of this Infusion distilled in a Glass Retort, left a bright striated Floscule, which by a greater Fire became a white dry Salt, of a Styptick aluminous taste; the Water which came off changed not with Galls or Oil of Tartar. This proves a parity of Parts between this mineral Earth, and Spaw Water, which is nothing else but this esurine acid Salt in its mineral Earth, being an aluminous terrestrial Glebe dissolved in the Water. The specific Difference of all mineral Salts depends upon, 1. A sulphurous Acid esurine Spirit. 2. A mineral Glebe, from the various Solutions and Mixtures, of which arise the variety of Salts in the Bowels of the Earth. Water impregnated with the acid sulphurous Spirit, scattered through the narrow Crannies of the Earth, according to the Mineral which falls in its way, becomes coagulated into such or such a Salt, for if it

meets with a saluginous Glebe, it becomes coagulated according to the Property of the Glebe, together with its connate Salt into a Salmarine, which is by the Water dissolved and carried into the Sea; hence it is brackish, and has its Mineral from fossil Salts, which also saturate some Spirits as *Knareburgh* Sulphur Water. If this acid sulphurous Water meets with nitrous Veins, it coagulates into Nitre, which dissolved and carried away in the Current, seems to be the Origine of intensely cold Springs, as *St. Magnus Well*, &c. which tho' exceeding Cold, yet by their sulphurous warming Property, donotably open the Pores of the Bathers, and resolve the congealed Blood and Latex, settled about the Joints and outward parts of the Body, and are the cause of Pains, Stiffness, &c. If this acid Water finds *Strata* of Iron, it is either the Origine of vitriolic or acid Spaws, as *Knareburghs* Sweet Spaw, *Tunbridge*, *Epsom*; the first has but little Mineral, a slight touch of Iron, and its esurine Spirit is very remiss: Hence its drinkers must swallow great Quantities before it operates. The Mineral of Copper coagulates this esurine Salt into a cupreous Vitriol, and either hords it up in Mines, or dissolves it into Water Springs. Or lastly, this Acidity is coagulated into Mineral cupreous Stones, resolvable by much Rain, which boiled and filtered, shoots into common Vitriol. But if this acid Water find an aluminous Glebe or Rock, it is thereby coagulated into natural Alum, as in *Scarborough*. The variety of Mineral Earths proceeds from their innate Seeds, shut up in themselves, which Seeds divine Power has dispersed in hidden Places in the dark Body of the Earth, whence variety of mineral Glebes, which beginning to shape Bodies for their ideal Essences, by forming to themselves a mercurial volatile Juice, and an embry-

onate

tack so reputed, sage, and learned a Physician, not having taken his Bachelors Degrees above six Years and a half, during which time, he

onate Sulphur, which two Principles the mineral archial Faber operates, ripens the elemental Crudities, and in process puts on a Tincture and Weight, and at last terminates in the coagulation of a perfect Metal, specified according to its Seeds.

Having laid aside so many of *Dr. Witties* Ingredients in this Water, and reduced them only to two, this is not done to depreiate the Water, for in the esurine Salt of Alum, are as noble medicinal Virtues to be found, as in any other mineral specified Salt whatever, this Salt being volatile in its *primum Ens*, and there exquisitely penetrative, forcing its way through Obstructions, notably refering them, restoring the Blood and nervous Juice to their Vigour; to explain which, we consider, 1. The Natural fermental Digestion of the Body. 2. The Depravations thereof. 3. The Diseases thence ensuing. 4. The Restoration of these Digestions, by removing the Obstructions of the Blood and Humours. But this we shall deliver almost word by word in the Helmontian Doctrine of Fermentation and Acidity. With this the Waters are improper, and either avail nothing, or are hurtful in the following Diseases from Helmont, *viz.* Pestilence, Pleurisy, Prunella, Poison, Leprosy, Pox, Morpew, Cancer, Epilepsy, Apoplexy, Palsy, but if the last four Diseases happen from Obstruction of Female Evacuation, drinking the Waters may break through these Obstructions, and clear the way, but then they are not considered as natural Distempers. To these he adds Fevers, and almost Catarrhs, Flatulency. But it is highly serviceable in Scurvy, Dropsy, Stone, Strangury, Hippo, Jaundice, Cachexy, obstructed Menses and Diseases therefrom arising, immoderate Vomiting, Heartburn, and Pain and Acidity of the Stomach. The Causes we assign for these Diseases, we have borrowed from the an-

cient Egyptian Hieroglyphicks, as the incoercible Flatus, culinary Digestion, *Evestrum vitæ*, Peroledi, Archeus, Gas, Blas, Deulock, &c. which we discourse of as distinct intelligent Beings in the human Body. These are things beyond the Ken of the present Age.---The Cause of all hot Springs is from mineral Salts acting upon one another, or on mineral Bodies, and for this we are obliged to the Observation of a noble Lord near the City of Bath, which was published in the *Philosophical Transactions*. Last of all, we come to the Essence of this Spaw, three Gallons, and three Pints, whereof he took up and let settle some time. Its first Precipitation was a reddish Sediment, from which he filtered the Water, dried the other in the Sun, and found it a red Earth, or kind of Ocre, such as falls to the bottom of all Channels of mineral Springs; then we put the Water in great Glasses placed on a Sand Furnace, with a gentle Heat. In a Day's time rose to the Surface of the Water a Film which we took off with a Silver Spoon, and dried in the Sun; it proved a light, scaly, white Floscule. Some more of the same separated after some time, some of it fell to the Bottom, the rest swam a Top, from which we filtered the whole Water, and dried it in the Sun, it was the same as before. Then we exhaled the Water in Glasses, and the Sediment was of an aluminous-nitrous Taste, but chiefly nitrous, and would give again in the Air; this we dissolved in Rain-Water, and filtered, it left an insipid, gritty, sparkling Powder. The filtered Water (which with Oil of Tartar gave a milky Separation, as tho' just taken up at the Spring, but Galls tinctured it not Purple) being again exhaled, what remained was dissolved, filtered and evaporated, the same was done a third time, each Filtration left a separation in the Cape. We took two Quarts of the fore-

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said

he had chiefly applied himself to the Study of Chemistry, in reading *Helmont*, *Paracelsus*, *Zwelfer*, *Seudivogius*, &c. which will very soon educate a young unexperienced Practitioner, and tend to make him litigious and prolix, as was really the Case of the Physician we are speaking of, who, in this Performance, accumulated a great many foreign Subjects, relating neither to mineral Waters nor their Use, as that on the constitutive Principles of all concrete Bodies, that on the universal Character scraped up from his Acquaintance and Conversation with the ingenious *Dr. Wilkins* of *Rippon*, his Ternary of Medicines, &c. As to what concerned *Dr. Wittie*, he was not long indebted to him,

said Water, which having filtered, we put in a Skillet, and boiled away two thirds, then let it cool; and a Sediment of insipid fell to the Bottom. The Water was filtered and exhaled, a pretty white Salt remained, which was dissolved in Rain-water, filtered, and the Calx being dried in the Sun, was a bright sparkling Powder, the filtered Water exhaled by a gentle heat till it was almost dry, then he filtered it again, &c. Thus we could at Pleasure separate from the limpid Spaw, as it springs up, eleven or twelve distinguishable sorts of Earths, different in Colour, Figure, and Consistence, which this alumino-nitrous Salt in the Water razeth off from several Rocks or Quarries of Stone which it passeth through; all these Sabulums were dried in the Sun, therefore not with different Degrees of Heat to alter their Colour, none of them were calcined, or suffered the stress of Fire, they were all insipid, for the Salt was concentrated in little room. From these fabulous Concretions, the Mischief (when it happens) accrues to the Drinker, for want of fit Medicines to carry off the feculent Dreggs, which precipitate upon the Bowels, Sides, and Orifices of the Vessels, obstructing the wonted Fluidity of the Blood. Hence in some Bodies, Fevers, Dropsies, Defluxions of Rheum, Stone, *Tormina Ventris*, Swellings of the Legs, or elsewhere, &c. These fabulous Concretions are from several Stones, Sand, or Earth, their Parts seem to be very dissimilar, some gritty

and hard, some soft and impalpable, some bright and glittering like Venice-Glass; others more dull, even the last separated of these Concretions, were so far from subtle and impalpable Powder, that they consisted of larger sized Particles, bright and sparkling like Filings of Silver. As to the esurine Salt, which is the Essence of the Spaw; it is a kind of alumino-nitrous Salt, which if rightly managed projects into Crystals or long Stiria, and brancheth itself forth into curious Shapes; it is almost of a nitrous Taste, and cast upon hot Coals or a Spatula, neither flames nor melts, flows neither in a Crucible nor strong Fire. Therefore where we said that Nitre is not in it, we desire to be understood of the common inflammable Nitre. The Proportion of this Salt to the whole Water is as 1 to an 128. A little of this Salt, which is the real Essence of *Scarborough*, taken in a Glass of Rhenish Wine, purges gently by Stool, and is as effectual in all Diseases where the Water is proper, and may even be given with Advantage in Fevers, and to cure Sterility. Thus we have all that relates to our Purpose in this Author. I have omitted here his several Subjects foreign to this Design, as that on the universal Character, his Discourse on the constitutive Principles of all concrete Bodies, his Ternary of Medicines, his Railing against the *Galenic* Practices, long and unintelligible Causes of Diseases, &c.

before

before he returned an Answer^c, tho' he had at this Time several other Avocations, as the Attendance on his Practice, his sedulous Application

^c *Pyrologia Mimica*, p. 127, *primo*-----
In his Preface he complains of *Simpson's* rude, illiterate, passionate, and uncivil Treatment of him, the Reasons whereof were, 1. His full and strong Intention, if possible, to lessen the Doctor's Character, and upon the Ruins thereof to establish his own. 2. To overturn the rational Practice of Physick at *York*, and establish the chymical Method, and make way for the Sale of his own Ternary of Medicines. The Doctor not unapprized of the Design, and the Mischief that must thence ensue, opposed himself to it, vindicates the Union of *Galenical* and Chymical Practice, defends the established Dispensatories till better offer, for this he was obliged to intermit his Studies, to attend the publick Coffee-Houses, those Places of Rendezvous of *Simpson* and his Party, till he succeeded. 3. He condemned the Doctor's Practice, depreciated his Judgement, and had decoyed some of his Patients, and as a Screen or Cover for all, he Quarrels with the Doctor's Judgment about the Spaw, despises his Learning and Book, and to decorate his own, borrows Experiments from all the modern Chymists, and he like *Faustus* went about to conjure up *Mephistophilus*, or, as if the Chymical Spirits were like the infernal, will not be raised without hard big Words, and unintelligible Jargon, and tho' his Experiments are borrowed, he rarely owns the Theft. His Style is peculiar, his Inferences are upon mistaken Grounds, he draws general Conclusions from particular Premises, his Philosophy is entirely new and precarious, his Candor and Ingenuity less, Defamation is his Masterpiece. As to Physick, he has had the Misfortune either to read bad Authors, or set out wrong, beginning where he should leave off, is an inconsistent Author, tho' Practice gave no Interruption to his Studies. And being a perfect Stranger to

the Spaw, yet from Hypothesis he can tell what Diseases it will Cure; then he proceeds to a long Detail of the Causes of Diseases from *Van Helmont*, and wretchedly mistakes his Author into the Bargain. He is obliged to the Doctor's Quotation for his Account of the Origin of hot Springs; and tho' he derives the Origine of all perennial Springs from the Sea, yet he overlooks four of the Doctors strongest Arguments for them from Rain, Snow and Dew. He is not only out of Humour with the Doctor, but with these grave learned Friends of his, who by some Verses had Midwived his Book into the World. Thus far from the long Preface, now to the Book.

Here the Doctor is very willing to stand a publick Tryal, he wonders that a Chymist should only acknowledge three sorts of Vitriol, when *Fallopious* assures us that every Metal has its own Vitriol, and the Doctor thought he had sufficiently proved that this in the Spaw was that of Iron, not factitious Vitriol. And Water alone says he, but especially assisted with an esurine Salt is capable to dissolve Metals; no wonder then we find this in *Scarborough*, which has both Water, Nitre and Vitriol. And a Dram of Iron may be got out of a Quart of this Water, either when Galls are put in it, or when its carried far in Oak Vessels or Bottles, and this Iron is of a styptick Taste, tinges the Mouth and Excrements black, and is preferable to *Crocus Martis*. The Doctor relishes not *Simpson's* Name of *Ens primum*, given to the esurine Salt, 1. Because this is the Name peculiar to the Deity. 2. Because the Water itself is a sufficient Menstruum, but if that is too great a Favour to be granted, the esurine Spirit of Vitriol, added to it will sure do the business. 3. All the Current of learned Men who have wrote on Mineral Waters, mention no such thing as *primum Ens*,

tion to the *Latin* Edition of his *Scarborough Spaw, &c.* In some parts of this Work he is pretty sharp, yet modest and moderate, considering the

Ens, all accounting the esurine Spirit of Vitriol enough to make the Waters acid, so as to corrode the Minerals or Metals they meet with in their Passage. 4. It is a Mistake, and contrary both to Reason and Experience, that when the esurine Salt has dissolved the Vitriol, they are thence capable to dissolve no other Body in their way, for Salts of several kinds may be dissolved in Water impregnated with one single sort, for Sea Water will dissolve Nitre, after that Alum, and then Vitriol. 5. That the *primum Ens*, or esurine Salt having dissolved the Vitriol, is thenceforth incapable of touching any thing, is contradictory to himself, in p. 59. where he says it still afterwards becomes determinated and speciflicated according to the Difference of the Mineral Glebes it meets with, in this or that fossile Salt or Mineral Mixture. And in p. 4. he says, if one of the Principles be made by this esurine Acidity, Nature is not at leisure to make another; this were such an Indulgence as she never granted herself. But in p. 45. thus far I assent, that an aluminous Salt from a Mineral Acidity had dissolved a slight Touch of the Mineral of Iron, and both dissolved in the current Spring of Water makes up the Spaw. Page 359. Upon a further Tryal of the Spaw Water, he found a Body of Vitriol which he calls *Terra Vitrioli*, and p. 360 and 364, he tells us he found Nitre in it, so here he finds Nature at leisure to make two or three Principles more, which was all the Doctor wanted, and he had denied. Nay, p. 3. he asserted it was impossible for Iron and Vitriol both to be in the Spaw; but the best Authors agree, that several Springs in *Europe* imbibe two or three sorts of Minerals in their Course. As to Iron, *Simpson* cannot possibly find out what is in that Water to dissolve. The Doctor says, Vitriol by its esurine Salt, makes this Water corrosive, and so does Nitre and Alum,

which will take in that or any other Mineral in their way; and *Paracelsus* says, that acid Waters are produced by the Resolution of Metals before they come to Maturity, that is, while they are yet in their imperfect State or Embryonism, and yet he says, the Virtues of these Waters depend upon their impregnating Principles, thus the Doctor thinks his Principles of Iron and Vitriol stand sure. And as to *Simpson's* sorts of Vitriol, he gives them not from his own sight, but from the Authority of learned Writers, as the Doctor himself does, who seems to understand them full as well as the other.

As to the Manner how mineral Waters imbibe the Virtues of Metals, Minerals, &c. That Waters receive it by Vapour, is evident from not only Copper and Brasses Vessels giving warm Water a Taste when it stood in them long, and Water standing long in leaden Cisterns causing a Dysentery, and the first Water will kill Fish in a Night's Time. *Simpson* says that Water will dissolve Vitriol, but that it should give it a Vapour, he understands not, and yet every drinker of *Scarborough* Water at the Spring, is sensible of its inky Smell. And *Fallopian* says, that vitrioline Waters are discernible by their Smell, as well as Taste. But neither will *Simp.* allow the Vapour of Iron in those Waters, because it is a more solid compact Body, tho' it is not a solid Piece of Iron the Dr. contends for, but like an ordinary Earth to look on, when it is newly digged, or by the Surges of the Spring Tide in Storms, it falls from the Cliff, yet it is so strongly impregnated with the concrete Juice of Iron, that in a short Time by the Sun's Heat, it becomes Iron Stone; of which within six Score Paces of the Spaw, there is as much fallen from the Cliff, as will load four or five Carts, some of which he put into a Smith's Forge, where he saw it fusible and melt in the Fire: This he shewed to several

the scurrilous Treatment he had received from a junior and inferior; and tho' it must be owned that the Doctor through his whole Writings shews himself a poor Naturalist, and no great Chimist, yet he
Disco-

ral Physicians who saw it Fact, besides thousands of Gentlemen, who have observed it, among whom was Mr. Cotton, overseer of the Iron-Mines in the Edge of *Derbyshire*, who was present with *Simpson* at *Scarborough*, and affirmed it to be Iron, and that he would undertake to make solid Iron out of it. Now the Spring passing through this Earth, may be supposed to imbibe some of its mineral Essence. Do not counterfeit Coins very often smell of Brass or Copper? does Steel in diet Drinks emit nothing? or wherefore is it put in? *Simpson* will have Vitriol and Iron to be the same, tho' the best Authors join both in their Prescriptions, and therefore suppose them to be different, for Steel is like good Metal without an Edge, and Vitriol like an Edge without Metal, but both joined make a Blade. And tho' *Simpson* says they are near of Kin, yet that mends not the Matter, whilst he denies the Existence of both in our Waters. It is chiefly the Vitriol that gives them the Azure Colour, and this *Kircher* affirms, let the other laugh as loud as he pleases, nor is it any precarious Philosophy. *Simpson* wants to know how the Dr. imagined that there was Vitriol or Iron in this Spaw, seeing the Badges of Distinction clash. That there is Vitriol in it he was satisfied, 1. From the eminent Acidity of those Waters, which both *Fallopious* and *Paracelsus* give for a certain Sign of Vitriol. 2. From the Vitriolic orinky smell of the Water. 3. From Galls tincturing it Purple. 4. From the great Quantity of vitrioline Salt that sweats out of the Cliff, of a dark yellow Colour, sharp to the Taste, beyond either Nitre or Alum. That there is Iron here is plain from 1. The Irony Precipitation from Galls or Carriage. 2. The blackish Colour it gives the Drinkers Excrements. 3. The great Quantity of Iron in the Cliff, out

of which it springs. 4. The Efficacy of the Waters in such Cases, as indicate the Use of Chalybeates. The Doctor's second Way whereby Waters imbibe the Virtues of Minerals, is when their Juices are dissolved in the Waters, to which *Simpson* makes no Objection; but comes directly to a vigorous Assault of his third, viz. by Corrosion of the Substance of the Minerals, and of this mind is *Galen*, *Helmont*, *Fallopious*, &c. for the Juice of Vitriol being of a corrosive Nature will fret and corrode Metals. But says *Simpson* the *Ens primum* or esurine Salt cannot dissolve or imbibe any more Metals than one, but this was proved ridiculous before. 1. Because a Water loaded with one Salt will nevertheless dissolve others, &c. 2. Because *Simpson* himself had acknowledged Vitriol, Iron, Alum and Nitre in those Waters. The Doctor's fourth Way of the Impregnation of Waters is by Confusion with which *Simpson* makes himself merry, tho' it is still Plain that Vitriol, Nitre, and Salt, being dissolved in Water, the Water and Salts are confusedly joyned together, every Drop of the Water having some of the saline Particles mixt with it, and existing in every part of the Water; and this Term of Confusion is often used by *Fallopious*, *Galen*, and *Kircher*. But tho' *Simpson* is all this while contending against the Existence of Vitriol in the Spaw, yet he finds *terra vitrioli* in it, and whence this Earth, where there was no Vitriol? and lastly, that his chymical Apothecary could find no Vitriol in the Sediment of the Water, upon the strongest Calcination: Does not Vitriol calcine white by both Heat of Fire and Sun? where then is the Strength of this invincible Argument? how can Vitriol being so much diluted in Water calcine into either a *Calcothar* or *Crocus*, so as to discover any other Colour than white? for upon their Dissolu-
tion

discovers a large Acquaintance with Authors, which he had read and well digested, and plainly appears to have been an excellent practical Physician, and a careful Observer of the Effects of those Waters.

Simpson

tion in Water, they must necessarily deposite the Colour they had, and this *Paracelsus* on the same Subject has fully resolved and determined, but had the Minerals been perfect in their kind, it might have been expected they should have calcined to a red or purple Colour, but no such thing can be expected when they are imperfect, and of this Opinion is *Fallopious* and *Zwelfer*. Had the black Sediment with the Galls been calcined, it would have given no small light, for the black Tincture is received from the Vitriol, that in the Bottom is the Iron, which he calcined in a Crucible till it was hard as a Cinder, and of a dark brown Colour, being no other than the *Scoriae* of Iron; this dissolved a fresh in Water, Galls tintured it not, so it was not Vitriol, tho' it was very brackish; this Water he exhaled again, and it left a sharp biting brownish Floscule, which Colour it had neither from the Vitriol nor Galls, therefore from the Iron; when he calcined the whole Body of the Minerals as they came together from the Water exhaled, tho' they turned white, yet were there here and there Flakes of Iron interspersed in the Powder, broad and thin like those that fly off hot Iron under the Smith's Hammer, from all which it is plain here are both Iron and Vitriol. The Doctor sent for ten Gallons of the sweet Spaw from *Knareborough*, filtered and exhaled it, the Sediment he put into a crucible and calcined, it was of the same Colour of the *Scarborough* Minerals, nor had it any Colcothar of Vitriol or Crocus of Iron nor Flakes like the other; the calcined Powder weighed a Drachm and a half, this he dissolved in spring Water, and from it obtained only seventeen Grains of Salt, here we see three Pints of *Scarborough* Spaw contain more of the Mineral Juices than ten Gallons of *Knareborough* Water. Hence the first is more ope-

orative than the last, and yet as pleasant to the Palate, and as safe to be drunk. Now *Simpson* grants that this Water has Vitriol and Iron, and yet it calcines white, and why may not the other which calcines white, as well have them, and tho' *Simp.* concludes the Section with discarding Vitriol and Iron out of the Spaw, yet after a little cool breathing he finds them there again in p. 39 44 and 359. The Doctor Defends his first Virtues of Iron and Vitriol from good Authority, and also his four first Galenic Qualities of hot, cold, dry and moist, and also what he had before asserted of Alum and Salt in the Spaw. Next he follows *Simp.* to *Scarborough*, where he says it proved lucky for him that he was there, or he had met with too warm a Reception; what he got by it, he appeals to the Gentlemen then present, who were also Witnesses how he behaved himself on that Occasion. As to Alum giving the same Tincture with Galls, tho' he tried but it answered not, the Doctor also infused the calcined Stone in Water, and Galls would not tincture this Water; he then tried the Alum-Stone of the Cliff and *Whitby*, but neither answered. In the Middle of the Alum-Stone Rock at *Whitby*, breaks forth a Spring of fresh Water twelve Fathoms below the Surface of the Alum Rock, Gall discolours not this Water, nor when exhaled does it leave any Sediment, which Mr. *Cotton* tried on the Iron-Stone Mine near *Barnsley*. The Doctor tried the same Water at *York*, without Success, nor did Galls tinge an Infusion of either calcined or uncalcined Iron-Stone in Water. It is not supposed that either Nitre or Salt do it, therefore it must be Vitriol. To the Query how the Doctor would demonstrate these to be vitrioline Spirits which the Water lost by carriage, he returns the former Answer; and to the Authority out of *Fallopious* he adds

Simpson being upbraided with Impudence want of Learning and Degrees, is herewith nettled, the first of these was natural, the second in a short time could not be helped, to remedy the third he posts off to one

adds Doctor *Heers* in his *Spadacrene*, where he is proving the *German Spaw* to have imbibed Vitriol, because, 1. Where such Acid Waters are found, there is usually seen something of the Minera of Vitriol near at Hand. 2. From the notable Acidity that is in Vitriol, suitable to that which such Waters have imbibed, he shews that the vitrioline Spirit of this Water is so volatile, that not only wooden Vessels will not contain it, but even Glass Stills or hermetically sealed Bottles. *Simpson's* Relation of their *Scarborough* discourse concerning Nitre is misrepresented; for the Doctor answered, he knew that there was Nitre, because it crystalizes into *Stiria*, when the Sediment was laid some Days in a cool Place. Here the Doctor heaps up several of his Contradictions, and assures us that that whole Process laid down in the Epilogue at the End of his Book, he had from Doctor *Sam. Johnson* of *Beverly*, tho' he had not the Honesty to own it, just as he tells us that the Sulphur Well at *Knareborough* is saturated with fossile Salt, and in p. 143, that a marine Salt is the Cause of that sulphureous Spring, and in p. 55, St. *Mungo's* Well at *Cockgrave*, tho' it is extremely cold to the Touch, yet by an intrinsic sulphureous warming Quality, it opens the Pores, &c. And in the same p. He says, that *Knareborough* sweet Spaw, is but languid of Mineral Spirits, having only a slight touch of the Mineral of Iron, p. 59. The *primum Ens* will now dissolve and take in as many Minerals and Salts as lies in its Way. *Simp.* thinks he Defames not the Spaw by calling it only an Aluminous Spring. But the Doctor desires to be of another Opinion, considering how far short Alum Waters are of this famous medicinal Spring, which has four other noble Ingredients in it; and this excellent Composition serving various Indications,

must do more Cures than Alum alone; for the Virtues ascribed to aluminous Waters by Naturalists, are far Short of those of our Spaw. The profound *Kircher* says Alum Waters are astringent, and of an exceeding drying Quality, and the Places where they are, are commonly barren; hence they are found surprizingly successful in the Cure of such Diseases as arise from too much cold and Moisture; but tho' our Water is astringent and drying, yet it is also purgative, and our Ground is very fruitful. He says *Knareborough* sweet Spaw contains only Vitriol and Iron. And in his Master *Paracelsus's* Judgment, Vitriol alone has greatly the Preheminence of Alum; therefore *Knareborough* Spaw is better than ours, and how much more so still when we allow him Iron into the Bargain. Where then is his, Let the Doctor know, and the World know, that in the esurine Salt of Alum, as noble medicinal Virtues are to be found, as in any other mineral specicated Salt whatever?

Fallopian and *Kircher* both think that chalybeate Springs are very scarce, for the first never saw one in his Life, but wishes they were more frequent, being exceedingly profitable in Diseases of the Reins and Bladder, and the last adds, they have in them the Virtues of Iron and Steel, whereby they open Obstructions of the Hypochondria, Hardness of the Liver, Spleen and those Parts, are good in a beginning Dropsy, and strengthen a relaxed and weak Stomach. And ours being a vitrioline Water, tho' not emetic, is thereby of a pungent penetrating Quality, attenuates and cuts gross flegmatic Humours, is drying and leaves a moderate Astringency behind it, is therefore good in cold and moist Constitutions, and for expelling of Worms; But Nitre being most predominant in our Waters, according to *Kircher*, it is powerful in its Operation,

one of the obscure Universities in *Holland* or *France*, gets dubbed Doctor with a *sub Camino* Degree in Physick, returns Home and makes a Reply to Doctor *Witty* ^b wherein he behaves himself a great deal better, more modestly, writes more intelligibly, and uses less Bombast, the

it corrects an ill Habit of Body, which the Pituitous are prone to; it loosens the Belly, is good in Diseases of the Nerves, and for such as are subject to De-fluxions on the Lungs, heals the Itch and other cutaneous Diseases, cures Noise in the Ears, and in a Word has a notable abstergent Property. Now this Spaw containing all these must derive its Virtues from all. The Catalogue of Diseases which *Simp.* will have this Spaw to cure, he takes Word for Word from *Helmont*, who indeed tho' he never knew of the Spaw, may be allowed as good a judge of it as our Antagonist, who pillaged also his five Digestions from the same Author, but some how lost his sixth by the Road. That the Alderman of *Hull's* Case was an Asthma (tho' *Simp.* will not allow it) Doctor *Primrose* of *Hull* is Witness, who was equally concerned for him with the Doctor, for several Years with little Success, till the Spaw relieved him in few Days, and he continued in perfect Health even till this Answer was wrote, which was fifteen Years after. We have almost daily Observations since of People cured of Astmas. *Simp.* is no better judge of another Gentlewomans Case, which he mentions, tho' he never saw her, she had a very great Weakness, Dyspnœa, and Hectic, even reduced to the lowest, yet the Spaw cured her. His Descant upon the Cure of an obstinate and desperate Catarrh, which had resisted all other Methods, is as ridiculous. Then he discourages on the Essence of Fevers, and like his Master *Paracelsus* exclaims bitterly against coolers, diluting or evacuating, and extolls his own fiery hot chymical Diaphoretic. He says the Green Sickness will not yield to the Spaw, because it carries in it no Body of Minerals to answer, tho'

five Quarts of it contain eight or ten Drams of Minerals.

Having thus followed the Doctor in every Step relating to the Spaw, let us take leave of him, and see what our Adversary has to say for himself further.

^b Hydrological Essays, or a Vindication of the *Hydrologia Chimica*, &c. together with an Answer to Doctor *Tonstal*, &c. Printed by *J. D.* for *Richard Chiswell* 1670, 8^{vo}.

Here he immediately closes with his Antagonist at downright Club-Law, with Arguments taken from the Doctor's own Authors, without making him a Leg. And 1. The Doctor asserts Vitriol and Iron two different Ingredients, or constitutive Principles of *Scarborough* Spaw; whereby he will have Vitriol a simple Salt, without any Dependence upon any mineral or metaline Body, and such as has no Relation to Iron being quite a different thing, and yet afterwards he makes the one to partake of the other, calling them *ferrum vitriolatum*, or *Vitriolum ferrugineum*; but we prove that the Doctor can produce no natural Vitriol, from which, by Art, may not be separated a mineral or metaline Body. Nay *Kircher* is very positive, that all Sorts of Vitriol consist of an acid sulphureous Salt or Spirit, in whose embraces are always one or other mineral or metaline Body couched, which is the main Pillar in the Constitution of the Concrete Vitriol, whether of Iron, Copper, or Silver; for if a lixivate Liquor or volatile urinous Spirit be poured upon a Solution of any Vitriol, whether natural or artificial, it immediately precipitates the mineral Body contained in it; hence when chalybeate Waters are depauperated of their Vitriol, they give neither Colour, Smell nor Taste of Vitriol by

Galls

the Secretary of the Royal Society in one of their Monthly Papers*, * Numb. 52. having given them a sharp Reproof for their too great Heat and Peevishness;

Galls, &c. nor are they so medicinal to the Drinker.----Says the Doctor, this Vitriol is not so properly an esurine Salt, as it has an esurine Salt in itself. If so, then some other thing must go to make up the Compages of Vitriol, which must be an embrionated Mineral Sulphur, as of Iron or Copper; if Iron, then it makes the Vitrioline Spaws of *England* and *Germany*, and all these differ according to the Disposition of the corroded Vein, or the different impregnation of the Preterlambent Water, with the esurine sulphureous Salt; if of Copper, then it makes the Vitriol of Copper. Yet all artificial Vitriols are made in imitation of Nature, as in those that are made out of Copper, as by burning of Sulphur upon glowing or melted Copper; or that by cementation of Plates of Copper stratified with common Salt or Sulphur, &c. therefore natural Vitriol is *partus immaturus Sulphuris embrionati*, and has its metalick Body in itself.

Neither has the Doctor defined his Vitriol in the Spaw, only he says its an esurine Salt, which acuates the Water, is able to corrode a Vein of Iron, and yet this Vitriol is not made out of the Iron. This seems to be inconsistent, except by Vitriol he mean a simple esurine Salt, and this falls short of expressing the true Essence of Vitriol, which is not Vitriol, but as it has a relation to a Mineral or Metaline Body. For *Helmont* says, That all the Seeds of Salts are placed in Water, yet are not endued with Taste, except they find agreeable Principles of Bodies, not till then they discover their Saltiness, and become determined into a saline Body, whether of Alum, Sal-marine, or Nitre; and that there is a Hermophradite general Salt of Metals suitable to all Metals, called an esurine or acid Salt, and the best Vitriol is most naturally brought forth in those Mines where Nature has laid up

that esurine Salt, corroding a strong Vein of Copper.-----A palpable Powder subsides in the Water. It is true, either from Carriage in Oak Vessels or Bottles, but especially that which turns black by putting in Galls, and tinges the Drinkers Faeces black. Now this Powder the Doctor says is the Iron, and takes its Colour from the Vitriol, therefore the Vitriol must be left behind in the Water, and upon a new Addition of Galls, the clear should give a fresh Colour, and yet it will not. So that this is the Minera of Iron separated and precipitated in the Spaw Water; then neither Powder nor Tincture of Galls will induce a Change, which they must do were the Vitriol still there; nay, dissolved lixiviate Salt-peter put into it, instead of precipitating, gives only a turbid milky Colour, and in a little while after, the *Sabulous Concretions*, and Salts, will be joyned with the lixiviate Salt, and form a Tartar vitriolated; hence it is evident Iron and Vitriol are not two distinct Ingredients.-----The Doctor says the esurine Spirit or Juice of Vitriol is enough to impregnate a Water with an Acidity, to make it corrode other Minerals or Metals by which it passeth, so that this esurine Salt, or *primum Ens*, may be laid aside as wholly precarious. The Doctor says, That the Spaw by its esurine Salt more freely corrodes the Iron, and that Vitriol has an esurine Salt in it self, and yet he says it may be laid aside as precarious, and presently takes it up as most necessary, strange inconsistencies! And for Answer to the first, Can the esurine Spirit or Juice of Vitriol impregnate Water as a Menstruum, and yet the same Spirit be wholly precarious? Reconcile this. The Doctor refers us to *Paracelsus*, but truly we are not so fond of him as he is, we admire not his Physiology, but his Medicinal Arcana's, by which he did great Cures, he tells us that Gold and

Lead are sweet, but Iron and Copper afford Vitriol.----As to Waters imbibing the Nature or Virtue of a Mineral or Metal by Vapour, as by standing some time in a Copper, Brass or Iron Vessel, till it taste of it; this is pillaged out of Dr. *French* and *Fallopious*, the last tells us these Vapours are either Sulphureous or Bituminous; besides these, he never found, read, nor will allow of any other benign ones; therefore he does not use it in the Doctor's Sense, nor does he once mention the Vapours of Vitriol, Iron or Copper; nor can it be understood in his Sense, that our Spaw partakes of Vitriol by its Vapour; and if there be a Vapour, it is from the Fermentation of Mineral Juices, which are not sufficient to make up any one Mineral Body, so as to be the Cause of an acid Spaw.----And if the Iron being in Embrionism give it self to the Water, yet it is only in its succulent Parts, and the Doctor explains an Agent capable of making the Iron spend itself; and if these parts of the Iron are corporeal (for incorporeal they cannot be) then the Vapours must have the essential parts of Iron in them, viz. Mercury and Sulphur. If so, what difference is there between the congregated Particles of Iron, and the Body of Iron itself? That Iron yields a Vapour in the Iron Works where it's melted, is from the Force of the Forge Fire, which sets both perfect and imperfect Metals upon the Wing, and take up their Abode in the next adjacent places; the like does Lead, Tin, Copper, &c. but where are these *Vulcan's* Forges under *Scarborough* Spaw? As to discovering counterfeit Coin by Smell, it is true there is a continual winding off, or wasting of the parts of Bodies, some sooner, others later, and to this all Bodies are more or less liable; but this is not the Case, for here is a rust of Copper, by the acid menstrual Salt in the Air, and this Taste or smell can only be ascribed to the Vitriol, for either Copper or Brass are very apt to gather a greenish Rust, which is its Vitriol, thus Carp put all Night in Water in a Copper brewing Vessel, might die from the dissolving of the Vitriol upon the

rusty Copper, or change of the Water, which might have some kind of Salt, and occasion the Death of the Fish. We tried the Experiment by putting Fish in a clear clean brewing Brass-Pan, and we preserved them two Nights unhurt, but brisk and active.-----As to Steel-filings infused some days in clear Spring Water, the Water filtered and evaporated, and leaving a greenish Salt, but all Spring Waters contain their Mineral Salt and Earth; hence that variety of Tastes easily discoverable by nice Palates. We also exhaled Water wherein Steel-filings had been infused, and the like Quantity of the same Water without Steel, and we had a like Quantity of the same Sort, and of the same Colour of Salt from each, but when we infused Filings of Steel in distill'd Water we had no Salt. As to the Apothecaries Boys laughing at Steel not emitting some of its Parts in a Diet Drink, let them burst their Sides if they cannot recollect that if it is some gross unprepared martial Body, some acid, as Lemons, is always added, or some Chalybeate prepared with Acids, as *Crocus Martis*; for it is required in all Chalybeate Extractions, that the Iron is reduced to a Crocus, either by Calcination, or by acid Spirits, or by affusing somewhat that has an Acidity; for by all these there is a Solution of some of the Body of Iron in the Liquor, but surely none ever ordered a Chalybeate Liquor by purely pouring distill'd Water on the Filings of Steel. *Fallopious* says, Iron Waters are not to be found, for if this Metal gave itself immediately to Water, we should find Iron Waters wherever this Mineral is washed with simple Element, now the Minera is loose, and if that yield not, neither will the solid compact Body.-----As to Iron and Vitriol differing as a Knife and Ink, and all Authors treating of them severally; we Answer they may be two distinct Bodies, but then the Vitriol must be such as is made out of some other Metal or Mineral, but natural acid Salt and Iron, are coexistent in the same Concrete, are both one Body, and make what we call Vitriol; from which take the Iron, and what remains is no Vitriol, but only

only a common Salt more simple than Vitriol, and all Authors that treat of Iron and Vitriol as different Subjects, do it severally, and not as they bear any relation to each other in mineral Solutions and Concretions, and herein they are right; but this is not the Doctor's Case or Sense. And as to *Paracelsus*, his *Physiology* is not only to be neglected, but he is very heedless in his Assertions, for he calls that a Salt which is reduceable to a more simple Salt, as Vitriol, which is separable out of Vitriol after the metallic Parts are separated; or if the Doctor can separate a Vitriol out of the Spaw, after the Precipitation of the Minera of Iron, he shall be owned Victor. If it is true that the main part of the Vitriol in the Spaw is Spirits, then we should doubtless catch it by Distillation; for if this Vitriol is Spirit very subtle, volatile, and penetrating, then these Spirits should first come over the Helm, yet this we tried once and again in a well luted Glass Retort and Receiver at the Spring Head, but without Success. But suppose we had obtained a Spirit, which by the Sharpness of its Taste, and Sulphureousness of its Smell, had demonstrated itself Vitriolic, yet would it not have followed that these had been Vitriol, it being impossible to make Vitriol out of these Spirits alone, which may indeed be coagulated into a solid dry Salt, but this as far from the Essence of Vitriol, as when Liquid and in form of Spirits. Now that Vitriol should yield itself by Spirit, and this Spirit impregnate the Spaw, and yet upon Tryal be found no such thing, is all Fiction.-----If these Spirits are so penetrative as to pass through the Glass and Lute, they must require or constitute a new Class of Spirits, such as are not in Nature, for this is what the most subtle Spirits of Urine, sal Armoniac, Hartshorn, &c. do not. As to *Heers* saying, that the *German* Spaw consists of Iron, Vitriol, and Ocre, and so making Iron and Vitriol distinct; *Helmont* who was a better Judge, could obtain nothing from it but clear Water, and a Vitriol of Iron, or the Body of Iron in the Vitriol. As to *Fallopious* saying that all acid Springs are Vi-

trioline, it is true, but that Vitriol must be allowed the mineral Compage of Iron or Copper, and it is not factitious but natural; for *Schroder* says there are fundry kinds of Vitriol, but that our Spaw has a vitrioline Acidity is begging the Question. Another Sign of Vitriol, says the Doctor, is its vitrioline or inky Smell, but when we examined the Spaw, neither we, nor several other Physicians and Gentlemen present, could discover this Apporrhea, Vapour, or Smell, nor any thing of Vitriol. But the Doctor in p. 13, 14, &c. impeaches us of endless Contradictions, in confessing a *Terra Vitrioli*, which still we affirm is only *Crocus Martis*, *Minera Ferri*, *Terra Rubrica*, &c. all meaning the same thing, viz. a Mineral, or metaline Ingredient, dissolved by the esurine Spirit, in vitrioline Spaws, or nitro-aluminous Salt, in nitro-aluminous Spaws, such as ours, so that all amounts only to Allum, Nitre, and *Ramenta Ferri*, but you tell us, p. 7. that Iron is now in the Spaw, a perfect solid Metal, but in *Solutis Principiis*, again p. 44. you say that Iron is here in its Body, which being calcined yields *Scoriae* like Iron; and yet, p. 80. you say that the Salt got out of Iron by burning it in a Candle, infusing it in Water or Wine, is the same with that in our Spaw, here is Iron in the Body and not in Body, and the Salt got out of it, is that great Aperient in the Water; it is not the Body of the Iron, for that is not in the Spaw, and tho' the Mineral of the Spaw calcine whitish, yet there are Flakes of Iron, interspersed, and why should the Minerals calcine into Flakes or Crocus, since we have not to do with perfect Minerals, and yet there are Flakes or *Scoriae* of Iron in the Spaw. Iron will not calcine into a Powder out of which Salt may be extracted, but the precipitated Iron in the Spaw you calcined with a strong Fire, and it turned to a gross Powder as hard as a Cynder, out of which you obtained a brownish Salt. How now, Doctor, why so many Contradictions, and yet lay them at our Door? That Vitriol must be in the Spaw, because of the Tincture of the Water from Galls; Alum also, whether crude.

Peevishness; but still he retains some of his dark chimical Cant. Whilst the Dispute is warm between these two Combatants, comes Doctor

crude or calcined gives the same Colour, and has the very same Variations on Addition of the like Spirit and Liquors. As to the dark, yellow, sharp vitrioline Salt that sweats out of the Cliff, sharper than Nitre or Alum: But how can this be Vitriol, when there are no Vitrioline Marcasites all along that Cliff, where we find that Earth or Salt? for upon the exactest Search, we could find no vitrioline Stones there. And since all Salts reside in their own proper Beds, where Vitriol Stones are, there is Vitriol bred, and so of Alum; and where both Stones are found, there we have Vitriol and Alum intermixed, but Vitriol Stone never affords Alum, & vice versa. That the Cliff out of which the Spring flows is plainly Iron, is a palpable Mistake, for all along the Cliff is chiefly Alum-Stone, and tho' it fall like Earth, harden by lying, and becomes fusible in the Fire; we answer, that scarce a hundredth, yea five hundredth Part of this fallen Stuff is Iron Stone, if any at all; but a Mixture of many Sorts of Stone, Sand, Earth, &c. fallen off from the Bank, crufted together by the Sun's Heat, and hardened by the Sea Salt and Weather, into confused Heaps.

As to Waters being impregnated by the Corrosion of the Substances of Minerals from the Help of concrete Juices, which extract and corrode mineral Substances, as the concrete juice of Vitriol, being of a corrosive Nature, and imbibed in spring Water, will corrode such Minerals as it passes through, as Iron Alum, &c. But supposing Juice of Vitriol to be in the Water, it is an improper *Menstruum* for extracting or corroding mineral Substances, seeing that the esurine or sulphureous Salt or Spirit had already coagulated it self upon a mineral or metaline Body, thereby to make up a Vitriol, which necessarily has these essential Principles to concur in this Constitution, so that if

the esurine Spirit in Vitriol, must become a *Menstruum* to corrode any other Minerals, it must first deposite that Body it hath already dissolved; so we see if a strong Solution of Vitriol be long boiled in an iron Pot, (which according to the Doctor, must make a considerable Corrosion) that no more of the iron Vessel is dissolved, than is precipitated of the innate cuprous Body inherent in the Vitriol. Nay Vitriol cannot become a *Menstruum* for mineral Bodies; nor aperient for humane Bodies, till it lay aside its first dissolvable; whether of Copper or Iron. So that should we grant a vitrioline Juice to be an Ingredient in the Spaw, yet can it not be a fit *Menstruum* to corrode or extract other mineral Bodies. As for what the Doctor quotes from *Helmont*, take the full Sentence, and it destroys his whole Design. As to the Doctor's fourth Way how Waters imbibe the Virtues of Minerals by Confusion, it is a meer Jingle, a confused indistinct Sound, being only a Mixture of Juices of Minerals abraded or dissolved.

Now as to the Doctor's great Piece of Ordnance placed against our main Fort, it is either not strong enough, or the Gunner knows not how to use it; for we urge the nonexistence of Vitriol in the Spaw from its not appearing on the chimical Apothecaries Experiments. For had there been either Vitriol or Iron in the Water, by three Hours Calcination it must have discovered it self either in *Colcothar*, or *Crocus* of Iron: But that Vitriol will calcine white either by the Fire or Heat of the Sun, we deny not, but cannot allow this white Colour to be the Effect of Calcination. For supposing Vitriol in it, yet take this white Powder, dissolve, filtre and evaporate, and you have a green Vitriol still, as at the first; which it would not do had the Whiteness proceeded from Calcination, and not Exsiccation; for what will

Doctor Tonstal of Newcastle upon Tyne on the Stage, a fresh Man, with

will blanch Vitriol, will exsiccate Plants. As to calcining Vitriol white by the Sun's Heat, as in the Sympathetic Powder, the same Answers shall suffice, being only an Explication of the Flegm of the Vitriol by the Heat. But ours of your Sediment was a true Calcination by the Force of Fire in a Crucible, yours was only a slight Exsiccation. Did Vitriol upon a thorough Calcination become white, you would be right. But Vitriol in any gentle Degree of Heat becomes white, increase the Fire it turns yellow; raise it yet higher, it is red and Purple, the menstrual Salt in the metallic Body being expelled. The Doctor's Quotations from *Paracelsus* here are misapplied, one Part left out, and a third none of his, only added to wrest his Sense. As the Doctor's imperfect Metal, Iron was by Force of Fire brought to the *Scoria* of Iron, which is Iron it self, so had the other, *viz.* Vitriol, been really such, tho' imperfect, for the same Reason, by Force of Fire it should have been brought to undergo the like change of Colours compatible to it as a mineral Body; he did so with the first Sediment precipitated in the Water by Galls, why did he not so with the other? Vitriol is neither corporeally in *Scarborough* Water, nor percolated, neither perfect imperfect, or any other Way, whatever it is in those Springs mentioned by *Fallopianus*. And as for the Instance drawn from *Knareborough* sweet Spaw containing Vitriol and Iron, yet calcining white. The Doctor takes that for granted against which we demonstratively argue in the Negative; for we demonstrate that a Vitriol which contains Iron in it is not Vitriol and Iron distinctly, but jointly make up a Vitriol of Iron, and that the esurine Acidity preying upon the Minera of Iron in that Spaw, had got a slight touch therefrom, and is a District of the minera of Iron, and hath not both Vitriol and Iron. Well, but the Doctor tells us, Vitriol is hot, but has neither told us what Kind nor what Part, whether

Colcothar, Salt, Spirit, Flegm, or Oyl. And Iron he says is drying, but this is his own *ipse dixit* without any Proofs, nor are we one bit wiser by their four Cardinal Qualities, they let in no light to the understanding, for many Medicines are of the same Quality, but of different Effects. But it is still more ridiculous that Filings of Steel cast into a Candle, should burn like Salt Petre, and that Filings infused in Water till the Salt is dissolved: then exhale the Water, and cast the Salt in a Candle, and it will not burn. None surely ever knew Salts flame or burn, this is one of the Properties of Sulphur only; so we conclude both this and the Heat of Vitriol to be Mistakes. The Doctor flatly denies that either crude or calcined Alum-Stone, infused in Water, will with Gall turn red, as well as with Vitriol, tho' he both knows it, saw it, and cannot but remember it demonstrate before his Face, before a great many Gentlemen at the Spaw, strange Impudence! As to this Experiment and our other Conversation at the Spaw, it was too visible how he was both galled and pinckt, before many ingenious Physicians and Scholars. Next Morning after some private Conversation on the Lashes we had given one another in Print, came the *York* Chimist, desiring to know of the Doctor, in what Part of the Cliff the Vitriol lay, who pointing to the Place, thrust in his Knife, and took out some of the crude Alum-stone which laid under the Saline Efflorescences; that this was Alum-stone, the Doctor could not deny, but said its Infusion would not strike Purple with Galls; we instantly made the Experiment whether Vitriol or Alum was in the Water, for if Alum did not give the Tincture, it must be somewhat else, *viz.* Vitriol. But if that did give the Tincture, then it was not from Vitriol, because Alum hath been separated, but never any Vitriol from the Waters. Now this Earth or Stone was put in common Water, powder of Galls was added which

which instantly struck a deep Tincture as did the Spaw. The Doctor before all the great learned Company trembled, turned Pale, fell into a sudden Passion, said, and repeated his Words, that he would take his Oath, that Doctor *Tonstal* told him last Year, that it was Vitriol. The Physicians present, begged him to produce his Vouchers. Not only the succulent but even the crude Alum-stone cast into Water, with a few drops of Oil or Spirit of Vitriol, or Sulphur and Galls, and Galls, would give a Purple, thus the Company broke up abruptly; an acid sulphureous Spirit or Salt dissolved in spring Water, is a *Menstruum* to take in the Tincture of Mineral or metaline Bodies, which lie in their Way, and this is a sulphureous Salt which sharpens the Water of this Spaw, compatible as well to Alum as Vitriol, is evident from this Experiment, *viz.* that in burning the Alum-stone, to make it fit to yield its inbred Salt, a sulphur is found thrust forth to the Surface of the Stone, by the Force of the Fire, which flames at a Candle, and burns with a blew Flame, with the smell of common Sulphur.

We made a Solution of Vitriol and Nitre in distilled Water, mixed and evaporated them in a gentle sand Heat, till both shot into Crystals, which were distinct. Then we took Vitriol and Alum Salt of each alike, dissolved them in distilled Water, filtered and evaporated to crystals which were also distinct. Then we took Solutions of Vitriol, Alum and Nitre, of each alike in distilled Water, which also filtered and evaporated, gave three Kinds of distinct Crystals, *viz.* Nitre striated, Alum white, Vitriol green, every one in their several Forms. But to remove all shadow of Existence of Vitriol in this Spaw, we took of the Marcasite Stones of Vitriol, near the Sulphur Well at *Knareborough*, which is the Minera of Vitriol, and if Vitriol be any where it is there in *Succo*; we powdered them and put on a Solution of Sea Salt, let them stand several Days together in a Matrafs, which by standing in the cold extracted a green Tincture

from the Marcasites, this we poured off and filtered, which with Galls struck a Tincture like the Body of Vitriol; this yellow, green, saltish Liquor, was exhaled in a gentle sand Heat, it shot into curious yellow tinged Crystals, which left an Ocre at bottom, but the Liquor wherein the Crystals were, did not turn purple with Galls, but fresh Water added to it made it Purple. The like we found on a strong Solution of *Dantzic* Vitriol, exhaled to an oily Consistence before shooting. In the Cliff above the Spaw are clear, bright Talstones, gritty Parcels of scabulous Earth like that in the Spaw. From the whole take these Corollaries, 1. That a Mineral in its crude succulent Parts may be dissolved in Spring Water, but when compact it requires a sulphureous *Menstruum*. 2. That the Marcasites of Vitriol and Alum have an embrionative Sulphur, connatural with them, produced out of the same mineral Seed. 3. That several mineral Salts, and other connatural Bodies, may consist disguised under one liquid Mass, which when taken off by a gentle Distillation or Evaporation, each shews it self in its own likeness. 4. That the Minera or Marcasites of Alum or Vitriol, do as really give their Tinctures, or yield their Solutions in Water, and do every Way answer the Operations agreeable to what's expected, or may be performed by their factitious Bodies. 5. That a mineral or metallic Solution, may have its Parts so concentrated, as it may not admit of that Alteration of Colours, compatible to the same Solution diluted. The Doctor asserts that Alum-stone neither crude nor calcined, infused in spring Water receives a Tincture from Galls; but of the contrary, let the Witnesses of *Scarborough*, and the Gentlemen of the Royal Society (who had the Alum-stone sent them, and made the Experiment) be judges. As to the Doctor's Spring of fresh Water, which rises out of the Alum Rock at *Whitby*, which gives no Tincture with Galls; it is a Mistake, the Spring washes not the Alum-stone, but at the Bottom of the Stone Quarry, under which lies a *Stratum* of

with an unexpected back Stroak • upon Doctor *Witty*, upbraids him with Ignorance of the Waters, want of Judgment and Ability to try

of Stone like Alum-stone, but not of a right Kind, called by the Workmen Doggers, or Catsheads, some whereof broken, have a transparent Falk in the middle of them. Nor, says the Doctor, does Iron-stone give a Tincture in Spring Water, as that Spring which rises in the middle of an Iron Mine near *Barnsley*, but afterwards forgets, and contradicts himself out of *Paracelsus*.

• *Scarborough Spaw Spagirically anatomized by George Tonstal, Dr. of Physick, Printed by J. M. 1670. 12mo. p. 60.*

In the Preface, he professes himself a Friend to both the Combatants, and setting personal Reflections apart, he is only for putting in his Mite towards adjusting the Dispute. He says Dr. *Witty* left off where he should have begun, contenting himself with a superficial Observation of what was most conspicuous about the Spaw, and trying its Tincture with Galls, hence draws fair Probabilities of his five Principles, and leaves it to others to examine whether they are there or not. As Anatomy hath discovered great things in the human Body, he hopes it may do the same in the Mineral Kingdom, according to the Rules laid down by *Tachenius*. The Cause of all this confused Noise, is the Liquor of the Spaw, which is commendable, and its Essence fit for the Cup of a Prince, but its *Caput Mortuum* being Sand and Clay, is fit only for the Bricklayers Trowel; hence the weak of Digestion, and strong in Distribution may be helped by it, but others will Experience the contrary; wherefore he gone, says he, ye gravely Persons, lest you get a Bladder full of Stones to rattle as you run.

It may be objected to me, that last Year I preferred *Scarborough*, this Year *Knareborough* sweet Spaw. Answer. 1. Hereby it is plain I am not pertinacious, Conviction works Conversion in me, I advised the same I used my self. 2. For the Gravel I did prefer the Nitre of *Scarborough*, before the Vitriol of *Knareborough*,

here my Mistake was incurable, till I sifted *Scarborough* Water in the Fire, *Spagiric* Anatomy soon made the Dirt appear. In 1666. Mr. *Tho. Holliard* of *London* cut me, and took away a Stone weighing four Ounces and a half, and in six Weeks after I went to *Knareborough*, remembering Mr. *Stones*'s Son's Case, who being cut, the Wound could not be healed up in three Months, before Sir *Theodore Mayerne* sent him to *Knareborough*, whose Water healed him perfectly in fifteen Days. I drank this Water with White-wine, it freed me from much mucous Matter, which might probably have occasioned another Stone. In 1667. I went thither again, but the Season being wet, the Water was weak of Minerals, and very likely the Trench about the Well helped to weaken it, by opening other Crevisses and Outlets for the Water to ouze through. In 1668, I went to *Scarborough*, whilst there I observed what Dr. *Witty* says, that when the Water was exhaled from the Body of Minerals they would not reunite with other Water, which satisfied me that there was somewhat in it besides the Doctor's five Principles, for the drier Salt is, it thirsts so much more for Water. Nor can these Principles, says the Doctor, be further separated, than by putting Gall to the Water, nor could sundry who have tried it come better off, but he and they wanted a little of *Boyl's* Philosophy; for Fire alone is sufficient to do this: by it alone, I extracted a pure Nitro-aluminous Salt out of this Water, and a large Quantity of *Fæces* apart; but know not but a great part of this Sand might happen through the Porter's Carelessness who fetched the Water, wherefore I wrote to Mr. *Simpson* to desist publishing any thing on the Spaw, before I had seen him and communicated my Observations; but his Book was in the Press. 1669, I returned to *Scarborough*, and tho' I dropt some Spirits of Salt into every Glass of the Water I drunk, hoping thereby to cleanse

cleansed off the Sordes of the Spaw, yet in a Fortnight's time, it gave me a Fit of the Stone, which was the first from my being cut. I went home and carried some of the Water with me, and upon Tryal, I found it contain, 1. Raments of Stone. 2. A Nitro-aluminous Salt. 3. A Glebe of Alum. Their Proportions are, of Stone-Powder one Ounce three Drains, of the Second, one Ounce six Drains, of the Third, three Drains; the Quantities of Salt and *Caput Mortuum* are equal, so that if five Quarts of Water gave one Ounce of Sediment, in this you swallow half an Ounce of Stone and Olay. This is the Reason the Sediment would not dissolve in Water, for the Fire hardens the last, nor can Water dissolve it. This Filth the Spaw has from this exceeding high Cliff, whose Bowels are full of Nitre and Alum Stone; it is this Dirt that damms up the Passages of the Body after long drinking, so as it will neither go backward nor forward till it is assisted by some Medicines. Is not this proper to *Scarborough* Water? Does any other do so? Do they leave a Sting in their Tail like this, or Stone-powder plastered on the inner Coat of the Intestines, disturbing their peristaltick Motion, and obstructing the Attraction of the lacteal Veins? But further, take a large Quantity of this clear Spaw Water, pass it through a woollen Cloath, boil it to the Consumption of one half, clear off that Liquor and see what Sand you have in the Bottom, which is so much of the Nitrous Rock, exhale that Liquor to the thickness of Oil, pour it out into a wooden Vessel, set it by in the Cold, and the Nitre and Alum will settle into Crystals. When it puts forth no more of those, exhale all the Moisture, put Water to it and filtre it, and you will find more Stone-powder in the Paper. Exhale this filtered Water, burn the Sediment in a Crucible, then dissolve it in Water, and filtre, and you have the blue Clay, or Alum Glebe. Go on, dissolve the first Crystals, filter and exhale, till the Crystals be pure and white, so will you separate more sandy Clay; from all which I affirm, that the

Nature of *Scarborough* is petrifying, first from the Authority of Dr. *Witty's* famous Kircher, ib. 8. p. 44. *Queritur quid proprie sit succus lapidificus, dico esse saxum nitrosum, Aquâ elignatâ.* 2. By Experiment, I find that the Spaw contains little else than nitrous Stone melted in Water, besides the Alum-stone that is imbibed in it. A Quart of the dropping Well at *Knaresborough* (a Stillacidum from a nitrous Rock) distilled in a Glass Retort, left fifty Grains of a pure white Nitre and Stone. Hence we see the Alum Juice has enabled *Scarborough* to corrode and imbibe more Stone than this dropping Well, not that *Scarborough* either Petrefies more, or as much as the other, which will set a Stone Crust upon a Loaf, or a Piece of Wood in a few Hours. The Reason is, the Alkali of the Alum in *Scarborough*, has in part imbibed the Acidity of the Nitre, so as it cannot penetrate the Wood, and leave a Crust of Stone, which the other Nitre will do. That Alum is an Alkali is well known to Dyers from its saponaceous Nature. Again, Alum put in a Crucible turns to a light porous Cinder, and the Body of all Alkalies are Spongy. Nitre on the contrary fluxes to a hard compact Body; whereby it is plain the Acid is prevalent in Nitre, and Alkali in Alum, therefore *Scarborough* cannot petrefy; but yet he that affirms that this Water has no such occult Quality, must first prove that it carries no Stone-Powder in its Bowels. 3. It is manifestly petrefying from the Apporthea of its *Spiritus lapidifici*. Here are in the Cliff petrefied Muscle Shells, which Dr. *Witty* says is done by the Sea Salt, if so, a great Mercy we are not all turned to *Lot's Wife* by the Use of Sea Salt. Again, when the Earth falls down by great Rains, on the Sands, when the watery Moisture is exhaled it petrefies, this Dr. *Witty* will have Iron. 4. From the Effects the Spaw produces, chiefly in those inclinable to the Stone, which occasioned a first and second Fit to me. This Dr. *Witty* confirms in another who never had a Fit of the Stone till he drunk those Waters, whereby it is plain the Thief was in the Water, and is there discoverable

ble by a Chymist at all times, and tho' the Nitre may expel some Gravel out of the Kidneys, yet the Stone Filings will generate another there; and I have found both in my self, Relations, and Patients, that drinking this Water, will both expel several small Stones, and breed a great many more, which will break out in Fits of the Gravel when they get Home, and to see the Difference between *Scarborough* and *Knareborough*, take an Observation of Mr. Henry Proctor of *Harnly*, which I had from himself, he was brought very low in a Hectic Fever, and Shortness of Breath, he in vain consulted Dr. Henry Poor, then applied to Dr. Neal, who sent him to *Knareborough*, where he coughed up several Stones till he was perfectly cured; had he gone to *Scarborough*, what had been the Consequence? The last Water is also dangerous in the Jaundice and Gout. Lord *Erwin* drunk of this Water, went home, fell into a Jaundice and died. Now all Spaws are the most deobstruent Medicine in the World, why then should *Scarborough* kill this Lord, but from the Water petrifying that sulphureous saline Humour in the *Vesica biliaria*, into Stones too great to pass the *Porus*? Dr. *Witty*, to me, blamed his being too free with Wine, but that could only encrease Choler, which unpetrified, of all other Humours, is the readiest purged off. If any think that tho' the Gall be petrified, yet it causes not Death in a short time! Let him consult *Helmont* and *Sylvius*, there he will find how necessary the Gall is for the Preservation of Life. An Alderman's Father of our Town never knew what the Jaundice was till after his use of *Scarborough* Water. The same was the Case of a Merchant's Wife here big with Child; after this Water she had a triple return, and was at last hardly cured with Spirit of Wine, Nitre, and Mercury elixerated. Dr. *Witty* knew a Gentleman of *Lincolnshire*, and his Lady, both fall into the Jaundice from drinking this Water after it was carried and had lost its volatile Parts. The Gouts Malice is from a petrifying Property of acid Spirits. I never felt this Disease till I went to *Scarborough*; as soon as I got free from a Stone in my left Kidney, I got this in my great Toe a Fortnight, and the Doctor owns frankly, that several have got the Gout by it for want of due Preparation, tho' no Spaw in the World has less need of Preparatives, and more need of Purges. Having now proved *Scarborough* a petrifying Water, and *Knareborough* not so, let us see whether *Scarborough* has any vitrioline Spirit in it, and if it have the Spirit of Vitriol joined with the volatile Spirit of Nitre, how does it differ from that deadly corrosive *Aqua fortis*, which is only two acid Spirits inseparably united? But if the Doctor say there is also Alum and Salt, then it is so much worse; for a Spirit from all these makes an *Aqua Regia*, which dissolves the hardest of Metals. But say that these corrosive Spirits are extorted by fires of Fire from their Bodies, which Heat we are not to allow in the Bowels of our Cliff? Answer. This is a small but no sufficient Excuse; for the prolific Seminals of all things generated in the Earth do come to their proper Matricis in a Vapour. 2. If this Vapour be of an ill Quality, it hath the same pernicious Effects upon our Bodies, as these sublimed by Art with Fire. 3. Nature can no more make this Vapour to ascend upward without Heat, than Art can sublime without Fire; therefore tho' Nitre and Vitriol distilled asunder are good, yet together they send forth the most deadly corrosive Vapour. But come we to the Doctor's Proofs of Vitriol. 1. Galls turn the Water Purple, so does Coal Water Alum-stone Water, sharpened with Spirit of Nitre. The Apothecary of *York* did this with a soft Alum-stone taken out of the Cliff, without Addition of any acid Spirit. The Reason of these Experiments, is, the acid Water dissolves the black Coal, or the blue Stone, and hides the Colour of them in its Pores, the Gall being put in and stirred amongst it, by its Alkali imbibing the Acidity of the Water, what is included therein is excluded toward the Bottom, where what is precipitated appears in its own Colour, the Spirit of Salts adding Lustre thereto. That Dr. *Witty* could not make the Alum-

stone, infused in Water, strike a Tincture with Galls, was, he only infused it, did not dissolve it, and the Gall could not precipitate the Alum-stone from the Water before it was dissolved, or any of its Parts in it. Nay, he could not make calcined Alum-stone put in Water, strike a Tincture with Galls; good Reason here also, for the blueness of the Slate that gave the Tincture was calcined, and then it is white. The Doctor sent to *Whitby* for Alum-stone Water, and to *Barnsley* for Iron-stone Water, but neither of them gave a Tincture with Galls. Why should they, being ordinary Spring Water, having taken neither Vapour, Odour, nor Sapor from the Mines? If the crude Alum-stone could not alter the Water, much less the Iron-stone which is a more solid compact Body; nor could the Hole in the bottom Stone imbibe dissolved Iron to tinge with Galls, except the Iron was in *Solutis Principiis*, like that at *Henwick*, which, with Galls, tinctures the Waters wherein it is infused, as high as *Scarborough*. Says the Doctor, the Tincture from Galls is neither from Alum nor Iron, but from Vitriol; but if from that, then it is from the Iron that is in it, and then it is *Vitriolum ferrugineum*, but if not from Iron, then its from Vitriol. Therefore it must be from Alum that *Scarborough* Water tinges with Galls. The Doctor's Second Proof is from the Sediment in the Bottom of the Oaken Vessels wherein the Water was carried, which was like *Crocus Martis*, and tasted of a styptick Quality, therefore it must be from the Chalybeate part of the Minerals. *Answer*. The Sharp Water carried in Oak Vessels corrodes their inner part, which settling to the Bottom with some Fæces of Spaw Water, produces a Sediment of the Colour of Oak, which if he had calcined, the Flame would have shewn him it was Wood not Iron. 3. The Spaw Water at forty Miles distance will not curdle Milk, colour with Galls, nor drink so acid as at the Spring. *Answer*. Alum curdles Milk as well as Vitriol; the more subtle any acid is, it curdles Milk so much better; the Water had then lost some of its subtle Spirit but not its

Vitriol which it never had. The Tincture from Galls is from the unburnt Alum-stone; for carry the Water some Miles from the Spaw, let it stand some Days, and it precipitates a blackish Powder, which is Alum-stone not Iron; for, 1. The vitrioline Spirit and Iron, are too great Friends to be so easily parted. 2. When the vitrioline Water settles its Colcothar without adding Gall to it, it is always Yellow, as in the Bason and Course of *Knareborough*. As to the Doctor's Iron in this Water, it is because the Earth that falls from the Cliff, hardens and turns to Iron-stone, fusible in the Forges, but when the Smith makes Horse-shoe Nails of this Iron, I will believe him, but at present I imagine it only a reddish Earth dissolved, with the Nitro-aluminous Salt, and petrefied in the Sun and Air, to a hard Lump fusible in the Fire from the Salt that is in it. The Doctor says, that because the Water tinges the Excrements black, therefore there is Iron in it. *Answer*. They are blue, the same with the Alum-slate-stone. The Doctor says he knows there is Vitriol in the Water from its eminent Acidity. *Answer*. Spirit of Nitre is acid as well as Spirit of Vitriol. The Doctor's next Argument is from the vitrioline Vapour, or inky Smell of the Water. *Answer*. To know the Smell of this Spaw, take oily Water (after the above mentioned Crystals are settled in it exhaled perfectly dry) add hot Water to it, and stir it about, and it stinks as ill as the Alum Pans at *Whitby*. Sixscore Spaces, says the Doctor, from the Spring, a vitrioline Salt sweats out of the Cliff. *Answer*. The Nitre spires out of the Cliff all along Westward from the Spaw, of a white Colour; this he owns to be Nitre beyond that the Colour turns yellow, from the different Earth out of which it sweats, for this Truth let him read *Kircher*. The Doctor calcined the black Sediment precipitated from the Water by Galls, and it was of a dark brown Colour, being only the *Scoria* of Iron, and there were in it Flakes of Iron broad and thin like those that fly from the Smith's Hammer. *Answer*. This calcined Sediment and Body are all one
Expe-

try them, inconclusive Arguments, and unjust Observations; he lets fly at Mr. *Simpson* at the same Time, for his too early Performance, before he had laid in a Stock of Learning. Doctor *Witty* returns an Answer ^f to both, with an Assurance it shou'd be the last Time, that
either

Experiment, for the Galls precipitate the gross Parts whatsoever they be, no wonder then it was hard, which had so much Stone in it. I calcined this Stone Powder, but could find no Iron in it, nor Iron Flakes. The right Improvement of this Water consists in three Indications 1. To resist the petrefying Property, but where is the Antidote? 2. To prevent the Stone Powder and Alum *Fæces* fixing in the Bowels. 3. In tender Constitutions, to prevent the duplicated Salt corroding the Intestines causing a Dysentery. From these three proceed all the Mischiefs of *Scarborough* Water.

^f *Scarborough Spagirical Anatomiser* dissected, or an Answer to all that Doctor *Tonstal* hath objected, &c. As also Reflections upon *Simpson's Hydrological Essays*, by Robert *Wittie*, London printed by B. G. for Nathaniel Brooke, 1672, 12^{mo} p. 127.

Some may imagine that this Piece comes too late, but it is soon enough, if well done; indeed it was finished a Year ago, but had some Reasons to suppress it till the Revolution of the Season of the Waters; and besides if this is not better than theirs, it is only fit for Bum-fother.

Tho' my Antagonists seem to argue against me, yet are they not so between themselves; what one calls the Minera of Iron, the other will have the Glebe of Alum; one says the Salt of them is Acid, the other calls it an Alkali; one affirms Nitre Acid, the other denies it; one will have the Salt of the Spaw to be Aluminonitrous, the other Nitro-aluminous. And so contentious are they, that other Matter failing, they will quarrel about the Colour of a T--rd, which one says is black, the other will have it blue. They pretend an outward Amity, but they can only agree so far as to unite against me, being *inter se Discordes*. Their great

Quarrel with the Spaw is its great Quantity of Sediment, which remains after Evaporation, but I never observed harm from it. *Simpson* charges my Quotations from Authors, as impertinent, wrested, or falsely translated; but expecting this from one who has Brags enough for any Thing, I deny the whole, my Quotations are fetched from the very Authors ch. and p. cited. The Confusion and panic dread that he alledges me thrown into at *Scarborough* is another Fiction, whereof the many there present were Witnesses. As to Doctor *Tonstal* in 1668, I met him there, his Wife being my Patient, he took my Advice about the Waters, and seemed satisfied about the Existence of Vitriol in them; but next Season I found him fluctuating, therefore I could not have the Notion of the Vitriol from him who never saw it till 1668, and I had wrote upon it in 1660. It is also false that I called the *York* Apothecary aside, and whispered in his Ear, that I would lay down the Cudgels and own *Simpson* for a Brother. How does he in his Book rail against the foreign Universities and Degrees, tho' to save his Bacon he was obliged to tramp beyond Sea to be dubbed Doctor, as we heard before, even with such a Degree as themselves contemn, giving it only to Noblemen or Gentlemen's Servants, to shew their Masters the Ceremony. As to his challenge for each of us taking equal Numbers of Patients to try our Success; as this is what he would be at, to make Experiments on Mens Bodies, but the Country is too well apprized of him now, few will trust his mischievous paracelsian Tools or Ternary of fiery Medicines. The Doctor accuses Doctor *Tonstal* of Levity, Inconsistency, and Disingenuity, in concealing the Arguments both in his Book, and in his

either one or both should draw him into a farther paper War on that Subject. This was followed quickly with a most satyrical ill-natured Reply,

his Letter to the Royal Society, whereby he proved the five Principles in the Waters, repeats his Arguments briefly, gives a short History of the State of Physick, before during and after *Hippocrates's* time to *Galen*, with an Account of the last, his Parts, Age, and Learning; then p. 25. comes to Doctor *Tonstal's* three grand Indications. 1. That the Spaw has a petrifying Property, without any Antidote, Answer, 1. *Kircher* in the quoted Place, is speaking of such petrifying or incrustating Waters, as really turn Sticks, Straw, Moss, &c. into Stone, not of those that generate the Stone in animal Bodies, therefore the Quotation is impertinent, nor has our Spaw either of these Qualities. And as to Nitre, all Naturalists in every Age esteemed it to be of volatile Parts, very penetrating, and a great dissolver, especially of Metals; of this Mind is *Kircher*, and fixes the petrifying Property upon Salt. For he says Nitre partakes of the Properties of Fire and Air, and so is full of fiery Spirits, but Salt partakes of Water and Earth, and so affords a Crasiness to all Sorts of mixt Bodies. Now how a Volatile, Penetrating, Dissolving Salt, should generate the Stone, I know not; for all Physicians have commended Nitre against the Stone, and *Kircher* himself gives it the Preference to Vitriol, saying such Waters purge, incise, penetrate, deterge, open Obstructions, move and expel the Stone of the Kidneys and Bladder. But whoever saw, or in what Author do you read of Nitrous Stones, such Earth there is, but not Stones; but *Kircher* himself often raves and is inconsistent, as where he says that either Salt or Nitre, or Alum, or Vitriol, or sulphur will afford Matter to petrify on Sticks. 2. *Tonstal* would prove our Spaw petrifying from a Parallel between it and *Knareburgh* dropping Well, which in a little Time covers Moss, Straw or Sticks in it, with a stony

Crust; but let him shew me a Stone so generated in *Scarborough* in seven Years, and I will yield. 3. He proves it from the petrefied Shells and such like on the Sands and Bank near the Spaw, which are become Stones by this Spring, but the Snakes were as sure turned into Stone by it; but how is their Body petrefied by it, and not their Head. Nor is there any such in the Cliff, but only on the Sand; and that the Sea petrefies, is plain from such Variety of Petrefactions, and large petrefied fish Bones, &c. cast out on all Shores: Coral is a Plant, yet turned to Stone by the Sea; as to the Earth falling down, and turning to Iron, I have answered that; and as to *Lot's* Wife she was not turned to marble, but mineral Salt. His fourth Proof from the Effect of the Water upon himself, and one or two more, where he gives a Quotation out of *Helmont* his Prince of Reason, which agrees as well to the Reason of that Operation, as a Harp and a Harrow, being indeed unintelligible. But pray where is the great Difference? *Knareburgh* brought away that mucous Matter which is the Cause of the Stone, and *Scarborough* the Stone it self, both expelled the unnatural Contents of the urinary Passages, only the first was in Embrio, the second bred; which agrees with the Learned that give the Preference to Nitre in the Stone and Gravel, and he that was wont to breed Stones may do so again; his Constitution was not altered by cutting; and had he consulted *Kircher*, he would have told him his Fate. Is it rational to think that whilst a Man drinks plentifully of this Water, and the Secretion of Urine thereby so quick and large, that it is likely he should at the same time breed a Stone, and that in fourteen Days Time? And he owns he felt nothing of this the Year before, when he drank it; a byassed Man ceases to be a judge in the Case of his Byass. *Tonstal* had another Card

Card to play than to tell Truth. I have in thirty Years known a hundred People cured of the Stone by this Water, but never heard of one that contracted it by it. A Lady shewed twenty eight Stones that she had voided by it, most of them as big as Peas. A *Scotman* voided half a Gill of small Stones and Sand at once by it, but the Doctor is the first that suspected it bred these. *Tonstal* accuses the Water of leaving those stone Tilings in the Body, which are the cause of, and condense into a Stone. Answer, This is a sort of O-crous Substance, which is left in more or less in most mineral Waters, and tho' after Exhalation it may leave a Sediment, which when mixed with Water, will not pass the Filtre, yet we have no Reason to imagine, they will not pass our Bodies with the same Ease they did the first Filtre, the Minerals having no Occasion to condense there. But tho' the Fire be a fit Instrument to try what's in the Waters, yet I cannot judge it a proper Medium to try its Operation on our Bodies, for the serum of the Blood is thin as Water in the Body, but turns thick as Glue before the Fire. *Newnham Regis* Water in *Warwickshire*, turns Moss and Leaves into Stone, and yet not a more noble Diuretic and Antinephritic Water found in many Ages. The dropping Well at *Knaresborough* is a great Petrefier, yet Doctor *Tonstal* has sent several Patients there, without News of its breeding the Stone, but he imagines that whatever is stony breeds Stones in the Body, and so is dangerous. But how then do Physicians prescribe Powders of Sparr, Crab Shells and Claws, Oyffer Shells, Pearl, Coral, &c. without the least dread of generating the Stone; but granting for once, that the Heat of the Body may condense the mineral Parts of this Water, as the Fire doth, yet how shall they pass the Lacteals of the Mesentery, Capillaries of the Lungs and Body, to breed a Stone in the Kidneys, nay if any Thing of this Sort do condense, it must go off by Siege, and then what harm? Stones indeed are found in all Parts of humane Bodies, from the im-

moderate Heat of the Parts condensing crass Matter; and there are petrefying Waters, yea such as congeal all into Stone, as that at *Claremont* in *Auvergne*, whereof they make Bridges and other Buildings, but there the whole Matter of the Spring is a lapidescent Juice (not Water) whose Motion hinders its Concretion as water in Motion will not freeze, so petrefying Waters differ *ad magis & minus*. Now the Sediment of the dropping Well at *Knaresborough* is only a strong Matter incapable of Dissolution in Water, or crystallization, but most of *Scarborough* Sediment both dissolves and crystalizes, therefore the last is Nitre, not the first. Finally if this Water expelled those Stones, which it is not reasonable to suppose it should breed, then is it an excellent nephritic, and noble Remedy against this Distemper, having prevented the Doctor a second cutting, which it must have come to, had they laid longer in the Body till they had been of too large a Size. Many Testimonies could I give of the Sovereignty of this Spaw in the Stone. And as to the Benefit of Mr. *Stone's Son* (of *Newton* upon *Trent*, which should have been printed) found from *Knaresborough* many Years, it is True, but he was never fully cured, till ten Years ago, he heard of our Spaw, came to it, was perfectly freed from his Malady, never returned to *Knaresborough* since, but drinks yearly of our Water. It is not our Spaw that brings the Stone, or Thief, but it is it that discovers it, and brings it away. As to the Patient in the hectic Fever that *Tonstal* says *Knaresborough* cured, by making him cough up Stones every Day. But what Design had the Doctor in sending an Asthmatic to *Knaresborough*? Did he know that he had Stones in his Lungs, and that the Water would cause him to expectorate them; or was it not most likely an accidental Cure? what Quality has this Water beyond *Scarborough*, to promote Coughing up of Stones? was it by an occult Quality in the Water, or a mistaken Fancy in the Doctor? But now let us cleanse out the Dirt the Doctor has thrown in the Spaw.

Spaw, viz. of Clay and Sand whereby it weakens the Stomach; this is in a great Measure answered already, but what Water is it, either common or mineral, which contains not earthy Parts, especially the last? Did he ever meet with this simple Element of Water, even Rain and distilled Waters not excepted? Is not our own Bath, and the most noted foreign Spaws known to contain much fixt indissoluble Sediment? But the Precipitation of his own beloved *Knareborough*, is worse off than any of the Rest, its Sediment being only Earth, and no Salt to carry it off. But I profess our Spaw sharpens the Appetite, promotes Digestion, and strengthens the Stomach, nor has Nature provided a better Remedy for a weak Stomach. But here he has brought an unsupported Charge, wanting all Evidence, tho' to my Knowledge, he solicited many for some, but all rejected him with Scorn. And tho' I could produce a Cart load of Witnesses of the Excellency of the Spaw in Debility of the Stomach, Flatulency, Belchings, &c. yet I produce no other than the Doctor's own Stomach, *Major Samuel Taylor's*, and the Landlord's Tables of the Place, which are always pretty clean swept, tho' there is pretty good Provision. No Hunters, Farmers, Plowmen, can make quicker or clearer Work at Table. As to the Dirt of the Spaw shewn to my Lord *Falconbridge*, his Lordship is of too exquisite Judgment, to be so slightly prejudiced, especially when the Doctor tells him, he did not know but it might be the Porter's Fault. But that the Sand and Clay are plaistered upon the Insides of the Bowels, disturb the peristaltic Motion and Attraction of the Lacteals, hard Words, fit Bugbears for Children, one Absurdity laid down occasions a thousand to follow, nay a frivolous Conceit. Another Mischief is, that when you have drank this Water a Month with Success, it takes a plaguy jaundish Fit, and will neither go backward nor forward: The same does *Knareborough*, and with better Reason, having only Earth and no Salt; no Water in the World is less guilty of this than ours; some do so in ten Days drinking,

others in a Fortnight, ours is acknowledged to hold longest out without this Fit. The Lord he brings to attest this Truth, professed then seriously to me, that he could never get rid of him till he took somewhat of him, but to no Purpose, till I gave him somewhat to open the Vents and carry off the Water, and he got much Benefit by it. But all judicious Drinkers should intermit after a proper Time, according to the Nature of the Water. But the Doctor to confirm his Assertion, wrests my Words, for all that treat upon the Use of Waters, lay down suitable Rules. He says the Essence of the Spaw is for the Cup of a Prince, but the *Caput mortuum* fit only for a Brick-layers Trowel: Well then all its Parts are good for somewhat, but sure the Vehicle is grosser than the Spirit, and the calcarious Part still grosser than that; who can separate a Man's Soul and Body, and then call it an entire Man? If the Salt be the Essence of the Water, *Knareborough* has little or none; for I exhaled ten Gallons of it for seventeen Grains of Salt, but a great Heap of Sludge; so there is nothing in *Knareborough* fit for a Prince, till he sell the extracted Salt of *Scarborough* there (which he draws at Home) at an extravagant Price, as a great Secret to mix with that Water. I deny not but *Knareborough* as well as other mineral Springs has its volatile spiritous Parts, which are not to be got or gathered by Art. But the earthy Part of those Waters, which will not pass the second Filtre are not useless, they make the Waters safer for drinking, by fortifying the Parts of the Body, they prevent that Ravage and Depredation, which the naked Salts and Mineral Particles in the Water would make upon the fine Vessels; hence gentle Restringtons or Corroborators are added to all hepatic and deobstruent Medicines.—Another frightful Indication is that our Spaw causes the Jaundice, and cites the Lord *Erwin's* Case. This by much Importunity he obtained from me in private Conversation, as a Brother, now betrays Society and Friendship, and blazes it abroad in the World, let every Man judge if this is the Part of

a Gentleman or Honest Man, that he certainly did himself Mischief by Wine, but this should not have been blazed abroad on a Person of Honour, after his Death especially. But the Truth is, he came to *Scarborough* in a deep Cachexy, very sick, fitter for a Bed than a Journey, drank only 3 Quarts of the Water in a whole Week, and that contrary to both my Advice and Doctor *Taylor's*, tho' it went very ill off; what Wine he drank I know not, but a Jaundice he never had; he was carried Home, died of the same Disease of which he came hither, and none can imagine that the Water hurt or killed him. As to the Alderman of *Newcastle*, he says his Skin was not discoloured, only the Water had petrefied the Gall in its Bladder, well seen truly, that could see what was in the Gall without any outward Appearance. But that a Man should have a Jaundice without the least discolouring of any Part of the Body, is contrary to the Sense of all honest Physicians, only the Jaundice was fancied and so was the Petrefaction, but the Alderman himself denied the whole Story in a Letter to me; a Looseness he had, but not the least Symptom of a Jaundice, nor could Doctor *Tonstal* persuade him of any Harm received from our Spaw. As to the Merchant's Wife with Child in the Jaundice, no two Pieces of the Story hang together. The Disease is a Petrefaction of the Gall, the Cause the Petrefying Property of our Spaw, the Witness is his own Suspicion, the Distemper is proved by a return of the Pain three Times, the Remedy thirty six ounces of Blood let, an antimonial Vomit, and a Mountebank Medicine of fiery Spirits of Wine, Nitre and Mercury elixivated, then comes the Saffron Colour on the Skin. The whole Truth is, from my own Scrutiny and Observation of others, she had a severe Fever with a Stitch in her right Side, and it is strange that Nitre which petrefied the Gall, should dissolve it again; bleeding so largely, and also Antimony to cure a Jaundice are Novelties; strange her Gall was petrefied and yet had bilious vomitings all along? but the Truth is, Doc-

tor *Tonstal* took the Case for a Pleurisy, and treated it as such for twenty Days, then other Physicians (who communicated the Case to me) were called in, they looked on the Case as desperate, and now blame *Tonstal* for challenging the Credit of a Cure, which neither he nor they did, not one of them understanding the Case till after, which truly was an Inflammation of the Liver. But that *Scarborough* is a most prevalent Medicine in the Jaundice, let the Cases of Sir *John Legard* and Mr. *William Hodgson* who had it every now and then returning testify, who were both perfectly cured in few Days; besides many other yearly Instances of like Kind, but never occasioned one. But come we to the Doctor's own Wife, whose Belly neither by Nature, nor his utmost Art could be brought to fall after a Child she had born. He talked with me very sincerely about her, I caused him to send for her, she came, was perfectly cured and returned well; Is this an ingenious requital, either to the Spaw or me? This Water reduces Corpulency, takes off the Reliques of inveterate Agues, and is most beneficial in the Scurvy, sweetens the Blood and opens Obstructions at the same Time. I could produce several Letters against his Cavils to the Spaw, sent me from these very Persons who have reaped the Benefit of it in these Cases he dissuades from it, and why should not the Women with Justice censure him, who censures his Brethren without Modesty; but to proceed, he says the Spaw is ill in the Gout as in his own Case. Here he is both Plaintiff, Witness and Judge; but it is so great a preventative of the Gout, as all Water is, that it deserves no Reply. That this Water has least need of Preparatives, and most need of Purges of any other, is false; for in many Persons if the first Passages or Intestines are not first cleared, what a long while is it before it open them, as in Melancholicks and Women: That it must have Preparatives is certain, and sometimes purges also. But certain Rules can only be given by a Physician present. But even his Assertion is inconsistent, for its purging freely

Reply by Dr. Tonstal^s, which though dedicated to the Royal Society, yet met with some pungent Reflections in the next Transaction. After this

makes it most safe, even in those Cases he imagines it most Faulty, as in the Stone, Jaundice, &c. And tho' he deny Vitriol and Iron in it, contrary to his own Conviction in 1668, yet I have formerly proved them to be really Ingredients, as *Simpson* denied them at first, but unguardedly confessed them all at last; he fancies that he has got me into a Pinfold, but I am got off before he got it ready, either that at *Wakefield* or *Gotham*. But now Mercy! see he places his great Guns and battering Rams against *Scarborough*, to shake the Foundation and rase the Building of the Spaw: viz. that Vitriol and Nitre joined, make a deadly *Aqua fortis*, thus he deals with the Spaw as *Joab* with *Abner*, tho' it cured his Wife, yet he poysons it. What tho' these two distilled together will give a corrosive Spirit? Mr. *Boyl* says so will Rye Bread: But these are the Effects of Fire. Another Sting in the Tail of the Spaw is, that its duplicated Salt may be in danger to corrode the Bowels and cause a Dysentery; but this is no Proof of the Fact, and we have two Astringents against it, viz. Alum and Iron; so we are safe, and we know and have seen it cure bloody Fluxes, which have long resisted other Methods. He shuts up his Book with a Bravado, to which I answer, that I ever shall approve a Piece of Art either in him or *Simpson*, whenever I see it, but both have, for Futurity, forfeited a right to my Secrets.

As to the dropping Well at *Knareborough*, it bubbles out of the Earth in a Meadow Close, about forty Yards from its Origine (which is on the Top of the Rock on the West Side of the River *Nid*) it runs in a very clear small Channel, into a spongy Rock about twelve Yards long, which hangs on the Edge of another stony Rock, (the whole Ground thereabout being Rocky) there it diffuses itself, and distils thro' the Pores of the spongy Rock, like a plentiful Rain on the Ground

below, which is all become a solid Rock, wherein if a Stick, Leaves or Moss lie some time, it crusts over with a thick Matter, and in time becomes a Sort of Stone like Lime-stone, but clearer and smoother; from thence it runs into the *Nid*, about a dozen Yards off, where this Water has made a Rock that stretches some Yards into the River. There is no Appearance of any petrefying Property in the Spring, till it reach the Rock, which seems to be made from the Petrefaction, which the Water at the Beginning might receive from the Rock upon which it hangs, from which it may derive a lapidescent Juice, and is doubtless eminently exalted in its Coldness from the spongy Rock, it being a very cold Water, which Quality meeting with the lapidescent Juice, and a small Portion of a fixt Salt, doth produce the petrefying Properties. It often Cures inveterate Fluxes of the Belly and a *Diabetes*, when exhaled it leaves a very sharp and gritty stone Powder, a little brackish.

* *A New-year's Gift for Dr. Witty; or, The Dissector anatomized, &c. London. Printed by J. M. 1672. 12mo. p. 162.*

He dedicates his Book to the Royal Society, appeals to them as competent Judges of the Controversy, Whether, 1. The Water consists not of the Principles he asserts, and thinks he has demonstrated. 2. Whether it will not leave some of its stony Matter and Clay in the Drinkers Body? 3. Whether it will not thereby generate Obstructions, tho' it do purge? 4. Whether it may not breed the Stone in the Kidneys. 5. Whether it be a proper Preventative of the Gout. 6. Whether it is a most innocent and safe Water for all, because some Athletic Constitutions get well quit of it. As to the dropping Well at *Knareburgh*, he took up a Quart of it before it came at the Rock, distilled and obtained from it half a Dram of pure Nitrous Salt, thus far it petrefies none; then

this, we hear no more either of this Controversy or Spaw before Dr. Lister's

then he took a Quart of it as it came out of the Rock and distilled it, and had fifty Grains of Stone-powder. A sure Sign of a petrefying Water is, that when exhaled by Decoction or Distillation, it leaves a Sand which is Stone-powder. Trying them by putting Stick or Moss into them to see whether they will incrustate them, is a fallacious Experiment, for they may be petrefying Waters, and yet many Circumstances prevent this. The main thing requisite in Incrustation is, that the Experiment be made while the Water flows immediately out of the Rock, and is in its Act of Corrosion; all Tryals by Petrefaction were thus obtained, but not at a Mile or two distance after the act of Corrosion was over, as is the Case of *Scarborough* Water; wherefore it incrustates not, for it runs out of a Lake two Miles direct South of it, through the Roots of those Stony Hills, dissolves the Stone, and performs its full act of Corrosion before it reach the Cliff, where it corrodes the Alum-stone, immediately after which it appears at the Bottom of the Cliff, which is in a Day or two; it precipitates to the Bottom the Glebe of Alum. A Second Reason of Incrustation is, that the saline Water which has newly corroded Stone, does penetrate through the Pores of what is laid in it, these it may leave a Crust upon, and the more porous the Body laid in the Water is, it petrefies it so much sooner. There is another Well a Mile from the dropping Well, which petrefies Moss only, and this is so hard, that one may walk over it as over a Bridge. The *Causa sine qua non* of petrefying Water, is that the Saline Water pass through the Stone whilst it's in Embryo, and therefore dissolves it; now the Sulphur Well at *Knareborough*, and the Alum Well at *Malton*, leave not a Grain of Stone-powder. All Spaws have their Name and natural Property from the mineral Contents they bring along with them.——The Reason of Dr. Witty's Railing at me, is

merely my dissent from his Opinion; if I seem harsh with him, it is all in his own Words retorted upon himself, so it is only fathering his own Child.——In his Preface he says, Dr. Witty has sent him a gilded Pill but desperately bitter, and as to Secrets he can tell him none since *Culpeper* has rifled his Cabinet, and laid them all open, and if he make a rejoinder to this, he contradicts both his own Book, and Title Page and Promise. If he chuse a Second, I shall find another; and I have cut out Work sufficient for them in the twelve following Propositions, one whereof answered, I will recall the rest. The Doctor recommends *Scarborough* Spaw good in all Diseases, but take these Instances of it. A Gentlewoman in *Lincolnshire* came there with a Letter of Recommendation to Dr. Witty, but sent for me, would not give it him, because they said, they all knew his Answer before they asked him. Mr. *Lamplugh* consulted him for a Hectic and Consumption, he advised him to drink the Water a Fortnight, which he did, and died soon after. My Lord *Cr-----*'s Nephew was by him, contrary to the Inclination of their Physician in Ordinary's Advice, sent thither for an Asthma, the Effect was the same. What shall I say of Mr. *Atkins*'s Case, sent hither for a Heat and Scalding of Urine; the two Mr. *Westby*'s in a Rheumatism; Mr. *Thorton* of *Newton* in a Paralytic Scurvy, tho' we have his Case and Sir *J. B.*'s Lady in a Jaundice registred among the Cures, because it sharpened their Appetites for a few Days; for as the Water is bad in Stone, Gout, and Jaundice from its petrefying Quality, so is it in the Rheumatism, from its nitrous and aluminous Qualities; but *Knareborough* Sweet Spaw containing only Vitriol, is co-natural to the Ferment of the Stomach, agrees with all Constitutions, offending none. Hence it cured Mrs. *Shaw* of *Ferrihill* of a violent Cough with Spitting of Blood, and Mrs. *Barker* of *Doar*, and Mrs. *El-*

lis of *Beverly*, of dangerous Ulcers of the Kidneys.—As to Mr. *Simpson's* Answer, it is a Pity so unripe Fruit should fall from so green a Tree, more Deliberation in Writing, and perusal of his Library, and Laboratory, would have mended it much for the perusal of the Judicious and Scholars; but I have saved him the Trouble of further Experiments, asserting that the fabulous Matter in the Water, is the Glebe of Alum, and not the *Minera* of Iron, nor need he distil the Urine of the Spaw Drinkers to seek the stony Matter there; for if a gentle Sand-heat will precipitate the Matter to the Bottom, much more will a natural Heat precipitate it in our Bowels. His contending for Alum to be an Alkali, and Nitre an Acid, affects not my Argument, why this Water petrefies not Wood put into it, for he owns an Acid and an Alkali in the Water, which is all I wanted, and by his Opposing me, he has only made room for the Doctor to break a Jest upon us both. That Nitre is *Filius Terræ*, is seen from his red Garment, that a Pound of it by Distillation, will afford a Pound of an extream acid Spirit, that it is a sulphureous inflammable Salt, that mixt with Alkali of Tartar, causes a great Ebullition, are sufficient Demonstrations of its Acidity. That a saponary Quality is *proprium quarto modo*, to an Alkali, is granted by all, that Alum has such a lixivate Proprety, Dyers know as well as I.

Now to the Book, It is certain that from Galls tincturing the Water, he takes his other four Principles from Probabilities instead of Arguments, even tho' I proved them all fallacious in excluding his Vitriol and Iron; and now as to Salt, he grounds that on the Spaws nearness to the Sea, though there are several fresh Springs as near the Sea, and at *Bermudas* they dig Wells of fresh Water within twenty Yards of the Sea; but having reviewed an Answer against Vitriol and Iron in the Spaw, and proving Stone-filings in the room of them; he sends a Letter to the Royal Society with seven or eight Extracts, taken out of the Spaw; this Letter was printed four Months after my Piece was published, yet I am blamed for leaving it out, but shall not overlook it now. 1. He is diso-

bliged with Dr. *Foot* for mentioning his Principles of Iron, Alum and Nitre, and leaving out Vitriol, as tho' Iron could be in it without Vitriol, and as to Vitriol, he says it is most conspicuous at the Well; a great Untruth, being only Nitre as the Crystals prove by his own Confession. But why upon his second Experiment has he omitted to present us with what he calls Vitriol? This had been more convincing than all his other Spirits and Extracts, which let us examine. The First is the Water exhaled till the Moisture is consumed, and only the Minerals remain; if this be properly an Extract, then no Mistakes. The Second is, dissolve this Extract in Water, filtre it, and there remains a little insipid Earth; exhale the filtered Water, and there remains the Salt, which is mostly Nitre, dissolve this in Water, filtre it, and there remains in the Cap-paper the Alum; this is sometimes found to be like a crystalline Sand, but why not more modestly expressed as elsewhere. The grosser Part of the Minerals are Metals, and why must not the Salt of Alum stop in the first Filtering as well as in the second? but exhale the second filtered Water, and there is a Salt. The Difference between these Salts is in the Degrees of Heat. This dissolved again, and evaporated, there is another Salt. When the Spaw Water is first set on the Fire, there falls to the Bottom a yellowish Powder; but he will not own what I told him, that this is the Glebe of Alum. Dr. *Witty* being reproved for constituting Five Principles before he had tried the Water, makes them Ten. Now what new Light has he given us from all those Experiments? even when next he has calcined the Body of Minerals, which before he told us were White, now he tells them, they may see they are of a manifest red Colour from the Iron, but whence this Redness, but from the Sand and Clay? Nay, he distill'd six Ounces of the Minerals, and got half an Ounce of Spirit from them to send up with the rest of the Packet; but how could he possibly procure a Spirit from them, without they were well stufed with Sand and Clay? this is giving Pains to contradict himself, for if the Salts fluxed in the Retort, they could never send up

up a Spirit, and flux they must without a large Mixture of Sand or Stone-powder. My first Argument from *Kircher* for the petrefying Nature of this Water, he rejects, calling the Author raving, uncertain, wavering, &c. but the Author's own Words are so plain they want no Interpreter, nor is there room for Contradiction; and any Salt Water, that will serve to dissolve Stone, will make the Water petrefying, and that no Salt in Water that dissolves not Stone can petrefy, this is abusing Authors. The second Argument is from Experiment, whence I shew that *Scarborough* is equal to all petrefying Waters, in their peculiar Property of carrying in them dissolved Stone, which is common to no other Waters. The dropping Well and it, only differ in this, that one incrustates Sticks, and the other Peoples Bowels, and the Salt of the first I declare is Nitre, as well as of the last; but let their Salts be what they will, if both dissolve Stone, and carry it in their Interstices, they are doubtless petrefying, and both of them exhaled leave a gritty Stone-powder, and himself confesses that both have a lapidescent Juice. The Third Argument is from the Apporrhea of the lapidescent Spirit, and the Muscle-shells we find petrefied on the Bank, which he says were cast up by the Sea, and so perhaps were the three Cart Load of Earth that lies petrefied at the Cliff Bottom. He says, surely the Sea petrefies any thing that has a lapidescent Juice, and I add, so do all the four Elements; for *Tachenius* proves, that a Flint-stone of One Hundred Pound Weight, laid in the open Air, will yearly gather Ten Pound Weight, or as to him that has a lapidescent Juice or tartarous Humour, contracting the Stone sooner if he eat much Salt Meat, this is against Reason and *Helmont's* Experiments. In my Fourth Argument from the Effects of *Scarborough* upon myself, he says *Knareborough* brought away Mucus or the Origine of a Stone, *Scarborough* a solid Stone, and prevented a second cutting; the first can never breed the Stone, being contrary to the Nature of Vitriol, but it is perfectly agreeable to Water loaded with Stone-powder. I

know Vitrioline Waters let fall their Colcothar, as Alum Waters do their Glebe. *Malton's* Spaw lets fall its Glebe, yet I like it not worse, seeing it has no Stony matter in it. Hence it is plain, 1. Were I for Interest, I should not applaud *Malton* which is still near the Doctor, and he owns it of like Virtue, and as quick and strong Operation as *Scarborough*. If he please, he may bring the Company from *Knareborough* thither. 2. It is a Fault in *Scarborough* Water as a petrefying Water, not as an Alum Water, and that it casts a gritty Stone-powder to the Bottom. One Experiment the Doctor made which he has not mentioned to the Royal Society, viz. That two Quarts of it passed cleverly through a Filtre, cold, and left not a Grain of Sand behind, so does a Solution of Pearl prepared with Spirit of Copper, in Spring Water, and yet you may have all the Pearl again in the Ladies Water that drank it, and this 100 times over. His Instances about the Serum of the Blood thickening before the Fire, and Sack leaving a purulent like Matter on a hot Fire-shovel, are both impertinent. It is the Action of the Vessels that keeps the first in Motion, and retains its finest Parts from exhaling. That like *Pus* in the last, is the volatile Sulphur and Salt united, and become a *tertium quid*. But to the twelve famous Propositions, the *summa totalis* of all my Writings on *Scarborough* Spaw, any one of which confuted I recant the whole, 1. *Scarborough* Water, has Stone-powder in it, which it leaves in a Sand at the Bottom of the Vessel wherein it is exhaled. 2. *Scarborough* Spaw is parallel to the dropping Well at *Knareborough*, which leaves the like Sand. 3. The Water that leaves this Sand, when exhaled, has a lapidescent Juice, and is petrefying. 4. The Water that has this Juice, and is petrefying, is of bad Consequence in the Stone, Gout, and Jaundice. 5. This is the Character, and that whereby *Scarborough* Spaw is distinguished from all others in use, that it takes a resty jadish fit sooner or later. 6. Alum-stone dissolved in Water, give a purple Tincture with Galls, the Doctor confesses this; therefore the Tincture with Galls is not from

ter's Treatise of the Medicinal Waters of England^h. But Dr. Simpson and Tonsal, were not all that Dr. Witty had to do with, for in [Number 52.]ⁱ of the *Philosophical Transactions*, we find him attacked

from Vitriol, but from Alum. 7. All Waters that have dissolved Iron-stone, contain also Vitriol. 8. All Salts that exude out of the Cliff, are Nitro-aluminous, not Vitriolic. 9. The Cart Loads of Earth fallen from the Cliff, is not Iron-stone, but petrefied Earth mixed with Peblestones. 10. The precipitated Powder in the Bottom of the Vessels wherein the Water has stood is Glebe of Alum. 11. If Vitriol be joyned with the Nitre in *Scarborough* Water, it is corrosive, which is worse than all said against it besides. 12. Dr. Witty must yield me the Victory, for Truths sake, or in Print.——If any want to see Railery, Invectives, wrestling of Words and Sense, and personal Reflections, &c. in perfection, he may consult these Authors on this Controversy, especially *Tonsal* and *Simpson*; for tho' this Book be dedicated to the Royal Society, yet in the *Transactions* [Number 85.] p. 5019, 20, 21, we find them very sharp with these Authors for their Ill-nature and unbecoming Behaviour, and also suspicious of the Truth, and unsatisfied with their Attempts, saying, we cannot but take publick Notice in these Tracts of the Discourses of that Subject, that come abroad by the Press; wishing only, that the Examiners of such matters as well as all others, would consider them without Partiality and Invectives, with all Care and Sincerity, thereby to Stock the *Philosophical Magazine* with such Observations as commend themselves by their Truth and Exactness; for the finding out of which, in the matter of the *Scarborough* Spaw, it seems to be very necessary to commit the Examination of what they both have delivered thereon to some, as well impartial, as intelligent Naturalists, to review what they have written, and repeat the Tryals they have made, &c. And again, we wish for further Examination of this Water, to be undertaken in an amicable and unbiassed

way, and by the Conjunction of some able and discreet Persons, with these two Disputants, that have hitherto very unbecomingly inveighed against one another.

^h From this time we hear no more of this Spaw till ten Years after that Dr. Lister favoured the World with his first learned Discourse on the Medicinal Waters of England in 1682, whilst he lived in York, p. 31. He says there is nothing in *Scarborough* Water besides Salt of Lime-stone, Ocre, and Calcarious Earth. Ocre, he says, p. 47. is the Metal it self of Iron, and therefore certainly contains in it self the Principles of Vitriol, which is thus demonstrated: Let Ocre be often and carefully washed till the Water will no longer receive a Tincture from Galls, yet if you lay it by in a moist Place a little time, vitrioline Efflorescences will rise out of it as out of the *Pyrites*; and the sundry kinds of Ocre have been one great Reason of the Difference among Writers on Mineral Waters. But it is most surprising to contend for Alum in this Water, which is a Purgative, and the other an Astringent; and for that which they call Alum Glebe, (p. 76.) if these Gentlemen would trust the Loadstone, they had been satisfied; for that Ocre which subsides in the Water, by Galls, Standing or Carriage, is most obsequious to this Stone; or if they will lay it up in a moist Place, they might in time have seen it put forth green Vitriol. He obtained an Ounce and a half of Sediment from twelve Pints of *Scarborough* Water.

ⁱ In these Words of Dr. Witty's, these Waters lose all their Virtue, yea their Quantity and Bulk also, tho' in Glasses, and under the Hermetical Seal, if removed from the Fountain-head, &c. It is universally agreed, that some sorts of Medicinal Waters lose their Virtue, if removed to any considerable distance from their Fountain-head, but others do not, at least so soon.

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To the last Class belong *Barnet, Epsom, Dulwich*; to the first belong *Tunbridge, Astrap, and Stall-bridge Waters, &c.* The common Custom of the Sick, taken from the Advice of their Physician, and the Experience of all in repairing to those respective Places, sufficiently prove the common Consent thereto. But tho' the Effect be so common and obvious, yet its Cause is not so plainly discovered. It is commonly said, that this Loss consists in the flying off of the most subtle, penetrating, and spirituous Parts, not to be imprisoned by any Inclosure imaginable, but will find an escape, and leave the Waters destitute of their Virtue, and decreased in Quantity too, and probably of their Weight: That this may be the Case our Author does not positively deny; but owns that it's the Sentiment of very many, if not all Physicians and Naturalists that have considered it, and he embraces the same Sentiments, and only relinquishes them with Supposition. But finding something in *Tachenius* relating to this, he is encouraged by his Authority to resume some Conjectures concerning the same, and desires the Publisher to give Notice of the following Conjectures and Queries, that the Learned may reason and find out the Truth of them. 1. Did ever Chymical Researches discover that such Waters ever yielded either a vinous, acid, or other sort of Spirit, whether inflammable or not inflammable, or flying over the Helm from the Fire. 2. Whether all the sorts of Waters, when they are most closely stopt up, and so let stand, or conveyed to some distance, do not let fall a Sediment, commonly yellowish, or some such Colour, when they are become effete in their Vessels. 3. Whether when they are let stand only, and not moved by Carriage, they do not sooner precipitate an Ocre to the bottom, and so become sooner castrated. 4. Whether such an Ocre is not found in all Spring Heads, and Streams also, but more in the first than last, and especially if the Stream be very long. 5. Whether two Bottles filled with this Water, the one well stopt, the other not, and both either let stand, or equally moved, will not equally lose their

Virtues in the same space of Time, have the same precipitated Sediments, be of the same Taste, Colour, and alike diminished in Quantity, with divers other such Circumstances. 6. Whether two Vessels diversified in their Matter, and consequently in their Parts, Pores, and Figures of the whole (as a Glass Bottle, and an Ox Bladder, or any two such like) filled with such Waters, will not yield the like Phænomena in all Circumstances, as mentioned in the fifth Query. 7. Whether it can be devised to prevent all Precipitation of a Sediment in the Waters vesseled up, and then to observe thereupon, whether their Virtues could not be kept entire during such a Prevention. 8. Whether ever any Observers found the Waters enervated, but they found withal another either let fall to the Bottom, or sticking to the Sides of the containing Vessel. 9. Whether the Phænomenon of loss of Virtues of such Waters, may by an Hypothesis of an intestine precipitation of their Parts wherein these Virtues consisted, be as well, if not better explained, than by the Hypothesis of the loss of Spirits through all Vessels and Closures whatsoever? which Hypothesis he only proposes, and leaves to the Learned to conclude. 1. Then it is generally received, that if there be any Medical Virtues in Minerals or Metals, it consists in their Sulphur, which is of a volatile and alcalized Property, especially when not intimately mixt with it, or after commixion perfectly freed from their Mercurial parts. 2. It is as much received even to become a Chymical Maxim, that Acids and Alcalies mutually operate upon one another to a Satiety, to an abating (and if Circumstances correspond) to an utter loss of their former Activities, and lastly to a Production of a *tertium neutrum*. 3. Again, they alike conclude, that Salts act best in a State of Solution, all which Premises centre in this Hypothesis, that the Waters which materially make some Springs passing under Ground by a Vein of some Metal, which yet is *in fieri*, having first taken up of an acid Salt, which is in the Earth, thereby catcheth hold of the immature Sulphur of that

ed by Doctor *Daniel Foot*, chiefly concerning the Cause of the sudden Loss of the Virtues of mineral Waters. And Doctor *Highmore* ^k to both

that Metal and presently glides it along with it self to the Springs Orifice, and from the Moment of the Sulphur and acid Salts meeting and contact, begin a mutual Action and Reaction upon one another, which never ceaseth, till both are imperceptibly spent and blended into a new Body, which then the Water lets fall, and we call it Earth, Ocre or Sediment; after the Production of which Ocre, the Medicinal Virtues of the immature Sulphur are lockt up in the inseparable Embraces of the acid Salt, and so are lost or at least disappear, but this mutual Action and Reaction may be lost, till the Waters issue out of the Earth, and for some small Time longer, and so long their medicinal Virtues are to be imparted and no longer. This is *Tachenius's* Hypothesis, let it be tried and live or die as it deserves.

* *Philosophical Transactions* N°. 56. p. 1128. Some Considerations relating to Doctor *Wittie's* Defence of *Scarborough* Spaw by Doctor *Highmore*, in a Letter to Doctor *Beal* of *Yeavil*. Dec. 17, 1669. Doctor *Wittie* has indeed gotten Ground of his Adversary (*Simpson*) but whether either of them has got right on his Side, he cannot judge, being a stranger to that Water, much differing it seems from those in his Country, and therefore may partake of other Minerals, and more both in Quantity and Number. But whether all these distinct Minerals reckoned up by the Doctor, do conspire to make up this medicinal Water, and that none of them can be left out may be doubted, and the Doctor himself seems to speak doubtfully of Salt, p. 89. Next he wonders why the Doctor set Alum in the Front of the Minerals that constitute his Spaw, for Alum dries, astringes and thickens. Now how the Water should be so great a deobstruent, and so beneficial to Hypochondriac and Cachectical Persons, being impregnated with so great an Astringent, he understands not,

nor does the Doctor satisfy us. Besides he acknowledges Alum Water will not tinge with Galls, as he confesses this will. Further why he should make Iron and Vitriol two distinct constituent Minerals of this Water, and call it *ferrum Vitriolatum*, I see not; as if Vitriol were a stranger to Iron, or that they were here two distinct Minerals, when indeed Iron alone affords both. Vitriol is the Salt of Iron, and there is no Iron without it, and that Vitriol which he says is found alone on the Rocks near this Water, will by the summers Heat be hardened into Iron, which in a Forge will melt and run. So that tho' Vitriol may be found alone without the Iron-stone, it is not because it is no Ingredient in the Composition of Iron, which cannot be Iron without it, but because these vitrioline Earths are not grown to that Perfection, but either by some accidental Mixture of other Bodies, is clapt up into the Composition of some other Metal or Mineral, or else wants these Bodies, or Time that should fix it into Iron. And truly the Opinion of the learned Doctor *Jordan*, that Waters are tinged by Minerals while they are *in Fieri*, may yet have much of Truth in it, however ridiculous some may imagine it. What can the Water receive from a perfectly fixt and wrought Metal, in its Passage by it? But when the whole Mass is in *Solutis Principiis*, no Part fixt by its Neighbour, but every one at Liberty, the Water passing through may easily lick up something of every Body dissolvable in it, and that the Bodies may exist in this State of Liberty for many Years, without a *Copula* to fix them into such a Metal, is not a Matter either unintelligible or ridiculous. The Salts in the Earth only combine with different Bodies, and make up several compounded Masses, which yet when dissolved, may communicate the same Properties. The Vitriol of Copper makes Water

both which he returns an Answer in N^o 60 of the Transactions. ¹ I know not whether Doctor *Simpson* rallied his Strength anew and made

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ter Acid, as well as that of Iron. Doctor *Witties* colouring of *Roman Vitriol*, p. 21, is false. P. 120, he is displeased that his Adversary allows the Saltness of the Sea to proceed from fossile Salt, or from such Rocks and Bodies of Salt which are often found in the Sea, besides the Saltness dispersed throughout the whole Body or the Earth easily imbibed by Water. The Doctor will rather have the Peripatetic Torrefaction by the Sun to be the Cause, which seems very improbable, for the Sun's Heat cannot act more powerfully on the Water to this Effect than Fire doth, yet this will never give Saltness to the Water, that is not already impregnated with saline Particles. And his Argument against *Simpson* seems not convincing, namely, that it would, if caused by fossile Salt, kill all Fish whether Sea or fresh Water Fish, &c.

¹ Doctor *Witties* Discourse in Answer to Doctor *Foot*, and Doctor *Highmore*, concerning Mineral Waters and Extracts made out of them. After the common Compliments to the Society and publisher, he intimates their Omission of Vitriol in mentioning the Principles of *Scarborough Spaw* in N^o 51. He next takes Notice of Doctor *Foot's* Notes and Letter (in N^o 52.) concerning the volatile Parts of Mineral Waters, together with his Queries, to which he declined returning an Answer, till Business called him over to *Scarborough*, where he renewed his Experiments with the utmost Exactness. As for Doctor *Foot's* referring to *Tachenius*, our Author could not have him in *London*, therefore can say nothing to his Principles, only he is certain these Kinds of Mineral Waters, are more pleasing to the Palate, and effectual if drunk at the Fountain, than when carried to a Distance; yet some of them endure carriage better than others, such of them as are impregnated with a Body of Minerals, as *Scarborough* and *Mal-*

ton, Knaresborough sulphur Well will suffer less by Carriage than the sweet Spaw at *Knaresborough*, which has imbibed little or nothing but the volatile Spirits or Vapour of some Minerals, which upon Carriage quickly exhale.

Now though *Scarborough* Water will endure Carriage, as far as any I know of, and yet retain its purging Quality not only Days but Weeks, when it stinks, because of its large Proportion of mineral Salts, which are not lost by the Carriage, but serve to push it through the Body, yet it suffers a great Alteration and Decay of Virtue, being conveyed to a Distance, which probably proceeds from the Loss of some volatile Parts, whereupon are also lost some alterative Properties, by which it should fortify the Crasis of the Stomach, and other nervous Parts, or open Obstructions, or expel the Stone, &c. therefore it is that I never saw a noted Cure done by it at a Distance. Nor can it be supposed that these Waters, which have in them a Body of Mineral Salts, can want these volatile Spirits which others possess, that have no Minerals at all. Nay it is plain that even *Scarborough* Water drank at the Town, tho' but one quarter of a Mile from the Spaw, has not near so pleasant a relish upon the Palate, as it has at the Fountain, (and some find it not so operative) but whether that Alteration comes from a sudden Loss of some Spirits, I will not rashly say, but chuse rather to prove it thus. It is such an Alteration as we observe in Wine or Ale, which after a while loses the brisk Taste or Relish, which it had when drawn out of the Cask, whereby it is not so grateful to the Palate, while yet perhaps, there is little or no loss of any vinous or frumental Spirits; but then after a Day or two it turns of a whitish Colour, and suffers some Degrees of Putrefaction, tho' I could never discern any Diminution of its Quantity. To prove the Truth of

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a fresh Attack in his *Zumologia*, but I suppose neither Doctor *Wittie* nor Doctor *Tonstal* made any further Sallies, for the last had lost all Argument

my Assertion concerning the Principles of this Spaw, I present them to you in their several Parts, with the Manner of their Extraction. As to Vitriols being sufficiently proved to be one of its Principles, I refer to p. 42, 43, and 44. of my Book. For being in its volatile Part it cannot be represented to the Senses at a Distance, tho' it be conspicuous at the Well. After Distillation or Evaporation of the strained fresh Water, there is found an Ounce of the Minerals in five Quarts, and in dry Weather ten Drams, which I take to be the product of the five above-mentioned Principles impregnating the Waters, it seems to have a compound Taste of sharp, salt, acid, styptic, and another different from them all. Dissolve these Minerals in pure spring or distilled Water, then filtre it through Cap-Paper, you will have a little insipid Earth in the Filtre, but the Water will be exceeding brackish; evaporate all that Water, and there remains a Body, which being duly prepared and time allowed it, will shoot out into *Stiria* an Inch long, being set in a Cellar or moist Place to crystalize, this I take for Nitre being of a nitrous Taste; dissolve this Body in distilled Water, filtre it, the Water is brackish, and in the Filtre will remain a Powder, which seems to me the aluminous Part; this is sometimes like a crystalline Sand; I think the Difference in the Shooting arises from the different Degrees of Heat, which is given it; evaporate this Water away and you have a Salt, in both which and the former, are small *Stiria*, which I take for nitrous Particles interspersed. This Salt I have sometimes depurated till it was as white as Chalk, and still it retained its Saltness. Now whether this is marine or mineral Salt, I leave others to determine; but I suppose it chiefly the Product of the Minerals, with a little Addition from the Sea. When the Spaw Water is first set

on the Fire, there falls to the Bottom a yellowish Powder, which if you filtre, the Water stays behind; whether this be the Ocre that subsides when the Water is carried to a Distance I am not positive, but the Colour of both is the same. The Sediment that falls to the Bottom after the Tincture of the Gall, I take to be Iron. Because *Simpson* has made a noise about calcining the Minerals, which he says were white, thereby he excludes Vitriol and Iron out of the Combination; I calcined them, and found them plainly red, which can never come from Nitre, Alum, nor Salt; therefore must from Vitriol or Iron, but most probably the last. If you take the Body of Minerals after the first Evaporation of the Water, calcine and rub it into a fine Powder, then sweeten it in pure or distilled Water, and afterwards filtre it, you will find a nitrous Salt, and a larger Quantity remains in the Filtre, crystalized through the more vehement Heat of the Fire. There are also other Parts which I fetch out of the Body of Minerals, which doubtless contribute much to the Cures performed by the Water, and drunk down in other Vehicles are very serviceable in the Hippo; as out of six Ounces of the Minerals, I extracted first an Ounce of Flegm, then four Ounces of Spirits sharp and acid, and gives Tincture to the Decoction of Roses like Spirit of Vitriol. I have sometimes observed this sharp Spirit crystalize to the Glass Sides, when it has been long kept, and losing its Acidity, becomes like the Flegm. Now he comes to Doctor *Foot's* Queries; and delivers only Facts, referring Speculations to better Heads.

1. I distilled the Spaw Water in a glass Still strongly luted to its Receiver, that no Spirit could escape me, and it yielded nothing but an insipid Water, and I expect no other from any of the mineral Springs.

2. This

Argument and fallen into down right Raillery and Porter's Language of the lowest Kind. If we reflect impartially upon the whole, it must be

2. This Spaw and all such as are impregnated with Minerals, whether they be let stand or conveyed at a Distance, let fall in Time a yellowish Sediment; but it is not so in *Knareborough* sweet Spaw, nor such others as have no Minerals, which have only imbibed the Vapour or Odour of Minerals. 3. When such Waters are moved by Carriage, they sooner precipitate that yellow Sediment to the Bottom, and especially if conveyed in Oak Vessels. 4. His yellow Sediment is plainly discernable, both in their Spring Heads and Streams; even *Knareborough* Water colours the Cistern in Time, altho' it has little of the Substance. 5. Those Bottles that are stoppt close, whether they be moved or not, will keep their brisk Relish longer than such as are left open, and also longer retain their medicinal Virtues, together with their Colour and Sediment. 6. He found not any Difference in the Vessels wherein *Scarborough* Water was put, viz. a Glass Bottle, or Ox Bladder, only that in the Bladder would not receive so black a Tincture from the Gall, as the other, but rather a Claret. 7. Neither himself, nor any he had met with could devise to prevent the Loss of the *De-obstruent* Virtue of this Water, nor hinder the Precipitation of the yellow Sediment, if removed at a Distance. 8. Notwithstanding this Water lets fall the Ocre, yet it remains Purgative from the other mineral Salts and Spirits, which yet it retains even till and when it stinks, and perhaps being fetid it may purge the more, as those who have drank it then have informed us, and *Knareborough* Spaw will be enervated when no Ocre falls to the Bottom. 9. *Knareborough* Waters and such like are better explicated to have lost their Virtues, by the flying off of spirituous Parts, since they have nothing else wherein their Virtue can consist; whereas it will not serve for *Scarborough*, from which these Spirits cannot in Reason be excluded: Nay they are found more eminently in the Minerals, and there-

fore must be allowed to it, and such like, an intestine Alteration and Precipitation of Parts, or some such Expression, which he refers to the Consideration of the Learned. Next come we to the three chymical Maxims quoted by Doctor *Foot*, viz. that great medical Virtues consist in the volatile Sulphurs of Metals and Minerals; but we would not have their fixt Parts excluded from their Use in Physick. 2. That Acids and Alcalies act upon one another, and their former Activities, and become a *tertium quid*. Answer; True, we see it made good in our present Waters; for they are quite another thing when they are in their Principles, agreeing with them in some things, and differing in others, as we said before p. 18, 19, 61, 62. of our Book. 3. This last I acknowledge. As to Doctor *Highmore*, I thank him for his Candour, even tho' a Stranger to the Water, and cannot think himself a fit Arbitrator betwixt us, but supposes that some of the mineral Principles may be left out. I think I have demonstrated the Existence of all his five Principles in this Spaw against *Simpson*, who yet after all his strong Denials, assents tacitly to the whole of them. I take it kindly of Doctor *Highmore* or any other ingenious Gentleman who desires Satisfaction, not quarrelling, to ask what Questions he pleases; but I think I have convinced them all of the Truth of my Assertion from the sundry Extracts sent up to the Royal Society. Doctor *Highmore* wonders that I fetch in Alum which dries, astringes and thickens, and therefore cannot see how this Water can be so great an Aperient, and so useful in Hippo and Cachexy. This inadvertency is either owing to the Doctor's superficial reading my Book, or to a bad Memory; for that this Water has much Alum is plain, even so much that *Simpson* will scarce allow it any other Impregnation. And as to Alums being so great an Astringent, so as it can neither open Obstructions nor loosen the Belly, that is true; and the Objection I have answered

be allowed that none of them were proper and impartial Judges. For
 1. Doctor *Wittie* could never make good his Assertion by fair Experiment

to *Simpson*, but I have at the same Time proved that all the rest are there as well as Alum, and treated of them and their Properties communicated to the Water in my first Book of *Scarborough Spaw*. There I have touched on the Virtues of Vitriol, Iron, Nitre, Salt and Alum; where we have explained both how it cannot, and how it can open Obstructions, and also purge without causing a Dysentery. Galls tinged the Waters proceeds from Vitriol, for neither crude nor calcined Alum will do it; nor will any other of the Principles tincture the Water, only in one Place of the Cliffe near the Spaw, where there is a little Alum-stone laid with the vitrioline Juice; the same will the Earth in that Spot do, being impregnated with Vitriol, but all the other Alum Earth will never tinge the least with the Gall. Doctor *Highmore* also wonders why I make Iron and Vitriol two distinct Principles, calling it *ferrum Vitriolatum*: This I said before was to distinguish it from Vitriol of Copper which is emetic. And in my Answer to *Simpson*, I have clearly proved them not to be the same thing. However since nothing will please these Gentlemen but Vitriol and Iron must be the same Thing: So Doctor *Jordan* doubts whether Alum or Vitriol are distinct, by which reckoning I might have confounded three of my Principles and saved my self much Trouble. Doctor *Highmore*, will have it that I said, the Vitriol which is found alone upon the Cliff will by the Summer's Heat become Iron; but the Doctor has certainly overlookt the Place, for I say that some of that which is like ordinary Earth, falling down turns to Iron Stone, and is fusible in the Fire. The Doctor is positive about the Colour of *Roman* Vitriol which I say is factitious; in this Authors differ very much; and I have good Authority that the *Romans* add that Colour to it, when they cast

it into Forms. Doctor *Highmore* will have it, that we assert the Brackishness of the Sea to be from the Sun's Heat, and not fossile Salts; but we deny both, and say it is connatural being so made, and so continuing, &c.

Doctor *Simpson* also in his Hydrological Essays, answers Doctor *Foot's* Queries concerning the Cause of the sudden Loss of the Virtues of mineral Waters. Thus 1. They never upon Distillation yield vinous, acid, or other Spirit, nor *Knaresborough* Sulphur Well. 2. That upon long Keeping or Carriage they do let fall a Sediment: For *Scarborough*, in forty eight Hours let fall its Sediment, and would not tincture with Galls. Another Bottle of it well cork'd and set by the like Time, then opened, did with Galls strike Purple, but lost that Property in twenty two Hours after. He sealed up the Bottle Hermetically, let it stand six Weeks, it weighed the same as at first, had let fall no Ocre, and tinctured with Galls. 3. If they are close stoppt, let stand unmoved, they let not fall their Ocre so soon, nor lose their tincturing Property. 4. They let fall their Ocre chiefly in the spring Head, then in the Streams, but none before they come at the Day. The 5th Query is answered already, and also the 6th. 7. How to prevent the Precipitation of their Sediment, that's done by hermetical Seal. 8. When Waters deposite their Sediment they lose both their tinging and purging Qualities. 9. Whether the *Phænomenon* of Loss of Virtues is better explained by Precipitation of Sediment, or loss of Spirit, and it is sooner and surer resolved by the first, for the second they have not nor never had, for all Doctor *Witty* is so confident to the contrary, from which I draw these Corollaries. 1. That mineral Waters operate and give their *Phænomena*, by a due coterperature of their mineral Ingredients. 2. That if mineral Waters precipitate

ment and Demonstration. 2. He was prejudiced in Favour of the Place, from the Advantages reaped by the Spaw. 3. His Antagonists having particular Views to serve, besides Discovery of Truth, and Love to Mankind, he was prejudiced against them. 4. Doctor *Simpson's* chief Aim was to disgrace Doctor *Witty*, lay him aside and make room for himself. 5. Doctor *Tonstal* had for two or three Seasons, attempted to monopolize the Business of the Place, but being disappointed becomes Peevish, vilifies the Water, and sets up *Harrigate* in Opposition to it; nor could so simple and cool a Method down with Doctor *Simpson*, who was all for the Paracelsian Practice, hot Regimen, and Ternary of Medicines. 7. Doctor *Lifter* was too much attached to his Hypotheses, too remiss in his Examination, scanty in his Ex-

pitate their Ocre they lose both tinging and purging Qualities. 3. So long as they precipitate not, so long they retain their Virtues. 4. To cause these Waters to precipitate, Motion, Heat, or Air is required. 5. Thus being preserved from these three, they retain their Virtue, Weight, &c. for Years. 6. Having Recourse to mineral Spirits for these Things solvable by Alteration and Precipitation, is imposing upon our Imaginations, by a Kind of customary Fascination.

Now come we to Doctor *Simpson's* Reflexions on *Tonstal*, *Scarborough* Spaw anatomized; and 1. He cannot agree with him that what he will have Alum Glebe, is truly Minera of Iron enclosed in the first; and to say that the Tincture of this Water with Galls, is from unburnt Alum-Stone, because the vitrioline Spirit and Iron are too great Friends to be so easily parted by Precipitation, is a Jest. Does not Solution of *Sal Martis*, or Copperas the same, especially by Air, Heat and Motion. Again says Doctor *Tonstal* all vitrioline Water turn the Drinkers *faeces* black, but this blue; but I say is not blue; a remiss Degree of black? Next from the Proportions of the fixt Parts of the Spaw. Doctor *Tonstal* will have it to be a petrefying Water, therefore bad in an Asthma, Jaundice, Gout, Stone, &c. But to prevent any Harm this Way, take these Rules, first give

a vitrioline Vomit, then drink pretty freely two or three Mornings of the Water, use gentle Exercise, and drink a Glass or two of white Wine two Hours after the Water, then eat a Dish of Broath, dine on few Dishes of Meat; after this give a Dose of Pills overnight, after which rest a Day or two from drinking, then vomit drink and purge, as before. So not only Danger will be prevented, but great Benefit reaped. The rest of this Tract is spent on the Dispute whether Alum be acid or alkaline, and therefore we pass it by.

There is nothing in *Allen's* natural History on this Water worth transcribing hither, only he says, its Salt precipitates not Solution of Silver, it strikes Purple with Galls. After three Days standing in an open Vessel, tho' somewhat remiss, the Water upon Stagnation is covered with an azure coloured bituminous Scum; or if it stand a Week, one rises on it like that on Lime Water. Four Gallons of the Water afford one Ounce of Salt, and an Ounce of stone Powder; the first is very bitter, and when fresh made has a sulphureous smell. A Solution of it turned *Sal Saturni* white as Milk, and curdles Salt of Tartar, flames not on a hot Iron being wholly nitrous, like that in the Earth.

Thus we have seen what others have said on this famous Spaw, *jam ad Pyxides nostras.*

periments,

periments, and hasty in his Conclusions; overlooks some Things, and takes others for granted. But,

I say both the purging and chalybeate Spaws (the last is also purgative, but requires a larger Dose, and is slower in Operation by Stool, tho' a brisker Diuretick) rises up out of the Sands within the Sea Mark, at the Foot of the Cliff, whose summit is above a hundred Yards perpendicular. This Cliff consists chiefly of Clay, Gravel and Stone, till it come within six or seven Yards of a Level with the Sands, then we have a *Congeries* of Alum-stone, Iron-stone, Clay, a kind of *Lapis Calcarius*, several Petrefactions of Ocre, Sulphur, Nitre, &c. I took up some Alum-stone that had not been exposed to the Air on the Face of the Cliff; this I powdered, and made several Experiments with it, but discovered not the least of any of its Parts, thus dissolvable in Water, so as to produce any visible *Phænomena* by Colorations. Neither Tincture nor powder of Galls changed the strongest Infusion I could prepare of it, either with hot Water or cold. Then I burnt a piece of this Stone half an Hour in an open Fire, powdered and infused it in common Water; it sent forth a most intolerable strong sulphureous Smell, the very same with *Harrigate* sulphur Water. This Infusion when cleared and filtred, I poured off into sundry Glasses; Solutions of Silver, Sugar of Lead, Sublimate, or any metallic Body dissolved in *Aqua fortis* or plain Water, made it presently jet black and thick, it soon curdled, and let fall a black Sediment, which dried gently before the Fire, and laid on a red hot Iron in a close dark Room, it smoaked, burnt with a blue Flame, and stunk insufferably. The Water poured off the Sediment stunk also. Then I dried the black Sludge that laid upon the Bottom of the Infusion, put it in a red hot Fire-Shovel, in a dark Room, it stunk worse than all the rest, and burnt with a rapid blue Flame. I tried another Piece the same Way, but none of the Solutions turned its Infusion black, nor did it stink so strong. These Experiments were made in very cold Weather in *October*, 1731.

I digged also a little Way into the Cliff, and took out a Piece of fresh Iron-stone, one Part whereof I powdered and infused in common Water, the other I burnt slightly in an open Fire, then powdered and infused in warm Water; when the first Infusion had stood till it was clear and filtred, I poured it out into several Glasses, but neither Tinctures nor Powders of Galls, Sumac, green Tea, red Roses, nor Oak Leaves, turned it red, blue or purple. The filtred Infusion of the second put into several Glasses, and the above Tinctures put to them, they

they altered not the Water at first, but after they had stood three or four Hours, they all turned of a pale Purple. I took a Piece of the hard Clay of the Cliff, and another Piece of that hard baked Clay within the Sea Mark, which Doctor *Wittie* calls Iron, powdered both and infused in Water, let it stand till they were clear, then filtered them, poured out the Infusion into several Glasses, and dropped in Tinctures of Galls, green Tea, Sumac, &c. into them, but no purple Colour or Tendency to it ensued.

July, 28, 1732. I took several Pieces of Alum-stone, and Iron-stone out of the Cliff, burnt them with several Degrees of Calcination, in an open Fire, then powdered and infused them in Water, the filtered Liquors I put out into sundry Glasses, as before, but the Infusion of Alum-stone turned not the mineral Solutions black, tho' they were of a darkish Colour and stunk, nor did they precipitate, as before, nor did the Infusion of Iron-stone strike Purple with Galls, &c.

I took some of the Salt that sweats out of the Cliff, dissolved it in Water, till its Earth subsided, then filtered it, and poured it out into several Glasses, with Tincture of Nephritic-wood it became green; with Tincture of Rhubarb, a light reddish yellow; with Tincture of Galls, Sumac, and green Tea, a muddy white, which afterwards turned green.

I took one Stone like a Knife Sheath, and one of the Petrefactions like a Boy's Top, tipped with two large bright brass Nails, one above and the other below, (which are frequently to be met with there) burnt them in an open Fire, and powdered them separately, and then infused them all Night in two Pots in clear Water, next Morning I poured off the Water and filtered it, the first tasted the same as the Water that has been long used in a Blacksmith's Trough; but certainly none beside the Tasters can possibly imagine the strange Combination of nauseous Tastes in the second: Had I not been well assured of the Non-existence of the Arsenic in Water, or its Petrefaction therefrom, I had certainly believed I was poysoned, for an Hour or two after. So intolerably strong were the Tastes of Sulphur, Iron-stone, Quicklime, but above all of stinking Fish. Some drops of the Solution of Quicksilver made the first a greenish yellow, the second of a reddish yellow. Solution of Sublimate affected neither. Solution of Sugar of Lead made the first of a muddy white, like clay Water, the second of a deep dark brown. Both of them with Spirits of Vitriol let fall a yellow Sediment. Spirits of Hartshorn turned both white and muddy. Syrup of Violets changed the first to a light green, the other to a yellow.

yellow. Infusion of red Sanders turned the first Red like calcined Iron-stone, the last was yellow between the Eye and Light, but blue sideways of the Light. Tincture of *Brasil* Wood made the first of a fine Peas Bloom, the second of a reddish brown. Tincture of Logwood struck the first blue, which separated much Sediment, and left a clear Liquor above, the second was of a deep blood red. Tincture of Galls altered the first to a fine Violet or Mazarine blue, the other to a light red. Green Tea, Tincture of Sumac, red Roses, &c. all turned the first of an opac or blackish blue, the last was a muddy clear.

November, 27, 1731. I took the Powder of the cover of a calcined Snake-stone, and of the Snake-stone it self, Powder of the Boy's Top, and Powder of the Inside of the Boy's Top all burnt in an open Fire, on each of these I poured three Gills of Water, let them stand four Hours, then filtered the separate Infusion and poured them out into sundry rows of Glasses; upon Trial of them, the *Phænomena* were inexpressibly quick and beautiful, changing instantly from one Colour to another; the first, third, and fourth brightened Solution of Gold, but the second was red with it. Solution of Silver turned the first and second of a blueish white, the third of a pale yellow, the fourth of a light blue. Solution of Copper changed the first and second a muddy blue, the fourth to a clear blue, the third to a pale green. Tincture of Nephritic Wood turned the first and fourth to a grass Green, at first touch, and thick, the second and third were whitish at first, then of a faint pale Green. Solution of Tin made the first and third of a deep yellow, the second blood red, the fourth yellowish brown. Tincture of Rhubarb turned the first, second and fourth of a deep blood red, the third of a pale reddish Colour. Solution of Sublimate changed the first to red, the second to a yellow exactly like beaten yolks of Eggs, the third reddish, the fourth white, which quickly changed, curdled, and let fall a deep brown Powder. Solution of Sugar of Lead made the fourth of a fine light white, the first to a paler white, the third paler, the second of a reddish brown. Oil of Tartar turned the first and fourth a clear Pearl, the second darker, the third a dark reddish. Spirit of Vitriol altered not the first second and fourth, but the third became reddish. Spirit of Hartshorn had the same Effect as Oil of Tartar, and Spirit of Salt the same as Spirit of Vitriol. Syrup of Violets turned the second and fourth a pale Green, the first green and the fourth a deep grass Green. Tincture of *Brasil* made them all reddish. Tincture of Logwood changed them all to an opac deep blood Red. Tincture of Galls at first touch, turned the first white as
Milk,

Milk, but it presently became green, the second was soon reddish, the third a very pale red, the fourth a deep blue, which instantly was of a deep green. When these four Rows of Glasses had stood twenty four Hours longer, these with Tincture of Nephritic Wood had all let fall a large deep green Sediment. The first second and fourth with Tincture of Rhubarb were of a light red and precipitated very much. The second with Oil of Tartar was full of solid white Flakes. These with the acid Spirits retained their clearness. These with Brasil were much paler. The first and second of these with Logwood had a very fine clear Liquor above, and a very large deep red Precipitation at Bottom, the second a yellowish Liquor, with a blackish red Precipitation, the fourth was clear with a pale red Precipitation. The first of these with Galls was now of a deep blue the first half Inch below the Surface, the rest of a muddy white, the Liquor of the second was clear with a leaden coloured Sediment; the red Colour of the third was quite lost. The fourth was clear above and had a very large green Precipitation. Green Tea had then turned the first of a pale red, the rest yellowish. From the Infusion of the Boy's Top, which I had reserved from these Experiments, I obtained a fine fixt nitrous Salt.

From the Examination of those Fossils through which this Water is strained, and by which we suppose it is impregnated, we come to try the Spring it self. *October 6, 1731.* being very cold Weather, I took of both purging and chalybeate Waters at Night, filled a Bottle with each, then half filled two other Bottles of each, and lastly set some in two brass Pans in the Room, let all fix stand uncorked and uncovered all Night, in a Room wherein was a good Fire. Yet after ten Hours standing they all struck a pretty good purple with Galls, tho' the purging Water was faintest, and that in the Pan palest of all; nor were they any heavier next Morning than when first brought into the Inn, both being then heavier than at the Well. I put a Quantity of both in two Pans, to exhale upon the same Fire at the same Time, but the purging Water lost its tincturing Property with Galls about the End of the second Degree of Heat, the chalybeate struck purple till it began to boil.

July 28, 1732. I compared in the Hydrostatic Balance the different Weights of Sea Water, Spaw, chalybeate and common Water. The first weighed one hundred twenty Grains in a Pint heavier than common Water, at high Water, and a very rough Sea. The Spaw at the Spring was thirty one Grains in a Pint heavier than common Water. The chalybeate there was twelve Grains heavier than

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common

common Water, the Spaw Water carried up to the Town was forty eight Grains in a Pint heavier, that is, seventeen Grains heavier than at the Spring. But the chalybeate was eighteen Grains in a Pint heavier at the Town. The Spaw and chalybeate both taken up at once, carried to the Town, and let stand two Hours, then tried with Tincture of Galls, their Colour (which with Galls is naturally of a whitish light Pink) was much fainter and weaker; when the Remainder of these Waters had stood all Night in open Bottles, and tried with Galls next Day at noon, the first tinged none at all, but in twenty four Hours was green throughout, the other tinged a weak purple just visible.

Solution of Silver changed both purging and chalybeate Waters of a pearl white, tho' both quickly precipitated the Silver white, to the Bottom of the Glafs, both of them brightened the Solution of Gold, but the first most. Solution of Copper changed both to a Sky blue. Tincture of Nephritic Wood first white then blue and lastly green. Tincture of Rhubarb changed both yellow, only the first was a brownish yellow, the last a dark and reddish yellow. Both were of a pearl Colour, and had variegated Pellicles, after standing mixt twenty four Hours with Solution of Sublimate. Solution of Sugar of Lead gave a milk white Colour to both at first, but they presently precipitated much white Powder. Oil of Tartar made both of a pale white, with a large Sediment of the same Colour, tho' the purging Water had most with a reddish brown cast. Spirits of *Sal Armoniac* and Hartshorn change both Springs whitish, the first more cruddled, and had a larger Sediment, with a red Cloud directly cross the Middle of the Glafs. The Chalybeate was of a paler white more mucilaginous, less Precipitation, no red, but a little greenish. Spirits of Vitriol, Salt, and Sulphur, on mixing, raised a very brisk Ebullition in the Waters, without any farther Effect. Syrup of Cloves turned the first to a deep green, but the last to a lighter green; fyrup of Violets changed both to a bluish at first, but after standing twenty four Hours, they were green throughout, both were yellow with Tincture of Fustic, and reddish with Tincture of Brasil, but the last was reddest. The Chalybeate with Tincture of Logwood was blue, the purging Water a brownish red. Galls turned the first of a light red purple, or whitish Pink, the last of a deeper purple. Tincture of Sumac turned the first of a Pink also, the last was deeper coloured. Please to take Notice once for all, that in the Examination of this and all the rest of these Waters, 1. All the Tinctures used were drawn

drawn in Water except that of Nephritic Wood, and Rhubarb. 2. That the constant Number of Drops to each Glas of Water was ten, from the same small vial Bottles, which I kept on Purpose; tho' drops often differ from the Size of the bottle Mouth, as well as the Fullness of the Bottle. 3. All the Tinctures of Galls were made from blue fresh Galls. The Galls, Log-wood and Nephritic-wood were the same in them all, having laid in a Stock to answer, before my setting out; the Glasses used were only Wine or Gelly Glasses, which rise from a large Basis to a Cone inverted. 4. A clean brass Pan was what I constantly used for Exhalation, over a clear Fire, in a clean Chimney. 5. I always took care that the Fire was not too strong.

November 4. I got a Bottle of *Scarborough* Water not half corked, and never sealed, which had been kept three Months, and stunk most intolerably; ten Drops of Solution of Silver dropped into a Glas of it, became instantly of an exceeding deep shining black, fermented much, cruddled and let fall its Sulphur, in a black thick Skin on the Sides and Bottom of the Glas, and the Water stunk nevertheless, and was in all Things the same with *Harrigate* Sulphur Water, only it precipitated not the Silver so instantly. Ten Drops of Tincture of Nephritic-wood put to another Glas of it, made it of a dark muddy white on mixing, then greenish white, next it cruddled and let fall its Sediment, which together with the Scum at the top, were of a deep green Colour. Ten Drops of Tincture of Rhubarb put to a third Glas of it, was of a reddish yellow. Solution of Sublimate turned another Glas of a deep Black, which separated and let fall a Sediment two thirds of an Inch high, the Liquor clear, and a blue Scum. Addition of ten Drops of Solution of Sugar of Lead had the same Effect on another Glas. Oil of Tartar in a Glas threw down a white loose Sediment three fourths of an Inch high; the same did Spirits of Hartshorn. The acid Spirits turned it of a bluish clear. Syrup of Violets and tincture of red Sanders changed it white. Tincture of Brazil-wood of a deep red with a whitish Cast. Tincture of Log-wood changed it of a dark brown. Tincture of Galls of a pale white, which soon became green throughout, Sumac and green Tea did the same; both the Vitriols turned it black. It was pleasant enough next Day to see how the clear Water, black Sulphur, and brown Ocre were all parted in the Glas that had Solution of Sublimate, and Vitriol of Steel in them. I poured off the clear Liquor from those Glasses with Galls and sublimate, after they had stood five Days and Nights, mixing them undesignedly, they presently struck a
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deep purple. Then I poured off the clear from those Glasses which had let fall a jet black Sediment, put the last into a Tea Cup, exhaled the remaining Humidity before the Fire, it smell'd strong of Sulphur all the while it was drying. The dried Powder from half a Pint of Water weighed three Grains, two whereof I threw upon a red hot Iron, it filled the Room with a strong Smell of Sulphur, sent forth a blue Smoak, then a Flame. The other Grain put into common Water wherein were ten Drops of Solution of Silver, did not become black, as before, for the Sediment did not dissolve.

A Pint and a half of *Scarborough* Water become fetid, (by standing nine Weeks) I poured it upon two Drams of Solution of Sublimate, it instantly was jet black and thick, but after standing three Hours it let fall about three Tea Spoonfuls of a black Sludge, and the Water became clear. This Sediment dried to a dark brown Powder, weighed ten Grains; this laid on a hot plate of Iron, burnt red with a strong Smell of Sulphur, but no Flame, there remained four Grains and a half of white Calx, which was the Sublimate that had been dissolved, with a little Earth. I poured a Pint of this fetid Water upon two Drams of Solution of Sugar of Lead, let it stand till it let fall its Sediment, then poured off the clear, tried it in several Glasses. With Tincture of Nephritic-wood it was a dark muddy white, next Day of a pale yellow. With Tincture of Rhubarb it was pale yellow, next Day a deep yellowish brown. With Solution of Sublimate it was a fine bluish clear, next Day it had a Scum of various Colours. With Sugar of Lead it was of a leaden Colour, the same it was with Oil of Tartar and Spirit of Hartshorn. Syrup of Violets made it a bluish Clear, next Day it was green. With Log-wood it was a deep yellowish brown, next Day a pale red with a small Sediment. With Galls clear and a little darkish.

Two quarts of the purging Water taken up in *December*, and exhaled left of fine white Sediment six Penny Weight or six Grains. Two Quarts of it taken up in *July* and exhaled, left of white Sediment seven Penny Weight and five Grains. Two Quarts of it taken up and exhaled in *September*, left seven Penny Weight, and twenty one Grains. So that the first is the least, and last the largest Quantity of Sediment I ever observed in this Water. In *July*, when three Pints of the purging Water afforded five Penny Weight and near a half, the like Quantity of the chalybeate Water left three Penny Weight and twenty Grains. Both these Sediments fermented strongly with Spirits or Oil of Vitriol, Salt, or Sulphur, with Juice of Lemon

Lemon or strong Vinegar; but not with Spirit of Hartshorn, *Sal Armoniac*, or *Sal volatile Oleosum*. They seemed to burn black, and swell on a red hot Iron, and crackled a little. Six Scruples and a half of the first Sediment afforded four Scruples and a half of Salt, and two Scruples of Earth. Four Scruples and four Grains of the last yielded fifty four Grains of Salt, and thirty Grains of Earth. The Salts separated from the Earth fermented no more with the strongest Acids, than the last did alone in the open Air, the Earths fermented violently, smoaking, swelling, bubbling and huffing. This Salt laid upon a hot Iron, melted a little, swell'd, blebbed and burnt to a Calx. The rest of the Salts dissolved and set by to crystalize projected crystals, Nitre chiefly. Those of the Chalybeate were the same but larger: The Earth calcined, the Load-stone attracted a very small Part of it very briskly; but the Sediment precipitated by Galls in the fresh Water, dried and calcined, was vigorously attracted by the Load-stone. The Calcination of those Earths is to no Purpose, except it be done in a Furnace that will quickly melt down Iron, a lesser Heat is too remiss, and will not fit the Iron in them for the magnetic Experiment. The Earth that the Load-stone acts not upon, is white, gritty, and hard, exceedingly Alkaline. The Spaw sends out about one hundred and twenty Gallons of Water in an Hour, in *March*, when all Springs are generally fullest and highest, but not quite so much in Summer. Which Quantity of Water then contains four Pound eleven Ounces of Sediment, about three Pound two Ounces thereof is Salt, and one Pound nine Ounces Earth. But in Summers Drought we must subtract a fourth Part Water and add a fourth Part more Sediment, and then this Quantity of Water contains five Pound fourteen Ounces of Sediment; or three Pound fourteen Ounces and two thirds of an Ounce of Salt, and one Pound fifteen Ounces of Earth.

From the whole we draw these Conclusions. 1. From the great Contention about these Waters, learn we how much need the Naturalist has to be upon his Guard, that he put not himself upon all this Trouble for the Support of some darling Opinion, Interest, or the Gratification of some Humour or Prejudice; and to take Care that he draw not false Conclusions from true Principles, nor make rash Inferences from false Principles, but attend diligently and impartially, with a sincere honest Mind, ready to receive Instruction. 2. As natural Truths may be, and often are searched out and discovered by an indefatigable Pursuit of rational Methods, and as Nature seldom eludes or disappoints such

such Attempts and Endeavours of her sincere Admirers and Investigators, so she as rarely makes those charming and useful Discoveries of these Truths by such as pursue them by improper Means, or to wrong Ends. 3. Since the upper Part of this Cliff which consists of Clay, Gravel and Stone, affords only some Ouzings of common Water, and the Bottom of the same Cliff through which our Spaw is strained, not only contains, but chiefly consists of a Heap of mineral Substances, therefore it is these Substances that impregnate this Spaw, since Springs filtered through common Earth only, do not impregnate Waters with medicinal Qualities. 4. Tho' this Spaw is strained through and impregnated by these mineral Bodies, yet it partakes not of all, but only some of them. For from the Experiments on the uncalcined Alum-stone, we see it communicates none of its Salts to the Water, nor is any of its Salt visibly dissolved or to be traced in the Water, when taken out of the Cliff from the other Minerals. 5. From our Trials on the calcined Alum-Stone we draw these Inferences. 1. That Fire disposes its Principles for Separation by Water. 2. Since the Infusion of half burnt Alum-stone gives a most sulphureous Smell, and a Solution of Silver changes it black, and precipitates a black inflammable Substance, and also the dried Powder that had been infused, smoaks, stinks and burns blue on a red hot Iron, we say it contains Sulphur. 3. But some of this Sulphur being precipitated in the Water, some still mixt with it after the metallic Solutions were added, and another Part laid in the Powder and was never mixt with the Water, we say that either some Parts of this Sulphur are more separable and dissolvable than others, or some Part of it is separable by a lesser Degree of Heat and Fire than the rest. 4. Since the burnt Stone communicates a Styptic dissolvable invisible Substance to the Water, which has a styptic sweetish astringent Taste, passes the filtering Cape, and crystalizes in a moist Place, we say it contains a Salt. 5. But a great Part of the Stone being neither dissolvable in Water, nor consumable by Fire, we call this Part Earth. 6. Therefore we find three separable Principles in this Stone, *viz.* Salt, Sulphur, and Earth. 7. Tho' the Salt and Earth are separable by Water after Calcination, yet they are inseparably united before, from some third Principle that is as a *Vinculum* or Cement; but the Fire destroying the Sulphur, and then the other being readily separable, it is plain that the Sulphur was this Cement. Therefore to separate the Salt and Earth, it is necessary that the Sulphur is first destroyed. But in a natural State Sulphur existing in great Quantity in this Stone, the Water cannot possibly dissolve or carry off any of its Salt; or be therewith impregnated,

pregnated, therefore there is no Alum in our Spaw. 8. It will not, nor should not, be hence concluded, that there are no mineral Waters impregnated with Alum, because I have not met with any of them; for there may possibly be some such Mountains of Alum-stone as contain but little Sulphur, or not sufficient to render the Salt inseparable from the Earth, and indissoluble in Water.

6. From the Experiments on the burnt and unburnt Iron-stone, we find that the constituent Parts of the first are not instantaneously separable in Water in a state of rest, without any other Mixture. But 2. Since the Infusion of the second gives a purple Colour with Astringents, we know the Fire has separated the Compages of its constituent Principles. 3. But Astringents giving this Infusion a purple Colour, and this being peculiar to Vitriol only, we say that the Salt of this Stone is Vitriol. 4. Both Salt and Earth remaining after Calcination, and yielding to Separation then and not before, we say that here also is a Sulphur which united the other two before. 5. Hereby we see that the Compositum of Ironstone is Earth, Vitriol, and Sulphur. 7. Since neither the Infusion of the Clay of the Cliff, nor that fallen down on the Sands, struck Purple with Astringents, we conclude it to be neither Iron, Iron-stone, nor contains any perceptible Vitriol. Nor can we possibly allow such a Permutation of natural Salts, that marine Salt soaked in by this Clay, should ever become Vitriol, or Iron, tho' we readily acknowledge, that some small loose petrefactions wherein is Iron-stone or Vitriol, may be sometimes mixt with this Clay, and if an Infusion of this should turn purple with Astringents, yet give us leave to say, that it is not the Clay, but the Petrefaction. 8. It is either not all calcined Iron-stone, or Alum-stone, that afford such quantities of Vitriol and Sulphur, nor do these Principles exist in the same quantity in them at all Times and Seasons, nor are they alike separable and perceptible. 9. We see that the Salt which sweats out of the Rock is neither Vitriol nor Alum, but Nitre, with which not only this Cliff, but all the Ground about the Town, is highly impregnated, and richly fertilized, hence most of their common Water abounds with Nitre. 10. From the Experiments on the Knifesheath, and one part of the Boy's Top, we see the first was only Iron-stone, the last a Mass of Nitre, Sulphur, and calcarious Earth. 11. From the Trials on the Snake-stone and its Cover, the Inside of the Boy's Top and its Cover, we learn, 1. That their Compositions differ little. 2. That the Cover of the Snake-stone consisted of Nitre, calcarious Earth, and a little Sulphur. 3. That the Snake-stone it self

was

was chiefly Sulphur, some Ocre, and a little Nitre. 4. That the Cover of the Boy's Top was Earth, Nitre, and a little Vitriol; its Inside much Sulphur, Vitriol, and Earth. 12. Since these and a great many other Petrefactions examined, were all found to consist of calcarious or ocrous Earth, Nitre, Sulphur, and Vitriol, differently compounded. Then 1. They are only the Product of the Cliff wherein these Principles and Petrefactions abound; and not of the Sea, wherein is only common Salt, Water, Sand, Seaplants, &c. 2. Since there is no Alum in them, tho' there is abundance of Alum-stone in the Cliff, we imagine it is not a proper Ingredient for Petrefactions. 13. Since Sugar of Lead gives a Precipitation and Sediment in the filtered Infusion of those Petrefactions, then here there is some Earth mixed with, and imperceptibly lodged in the Pores of the Water, which is separated by the Sugar of Lead. 14. Since these Spaw Waters weighed so much heavier at the Town than at the Spring, tho' no colder, yea warmer in the Summers heat, then they contain a more dilated Air, or a very subtile Mineral Spirit. 15. Since they weigh as heavy when instantly carried up to the Town, as they do a Day, a Month, or a Year after; then this plainly shews us the Volatility, and sudden Loss of this Spirit. 16. Since this Spirit is so quickly and irrecoverably gone in whatsoever Vessel it is put, whether Glass, Wood, or Stone, corked or uncorked; it is plain that no Wax, Oil, or such other Contrivances avail any thing toward bribing or commanding this Spirits continuance. 17. That this Mineral Spirit is no Fiction, but a Reality, we are further convinced, from the Waters sparkling much when poured out fresh at the Spring-head into a Glass, from its intoxicating the Drinkers there more than common, or the same Water carried or kept a little, and finally from its sitting much lighter on the Stomach, and going sooner off the Body, fresh at the Spring than afterwards. 18. But the Chalybeate Water weighing still heavier (in proportion to its Contents) at the Town, than the other, therefore it seems to be more richly impregnated with this Spirit. 19. Since Galls, Green-Tea, Oak-Leaves, Sumac, Red Roses, &c. turn these Waters purple, therefore they contain Vitriol.

But here I am stopt by some whispering me in the Ear, that I run too fast, and take disputed things for granted; I know not but my Vitriol may prove Alum, and what then? I answer, 1. Vitriol and Nitre I find in, and can extract from the Petrefactions, but no Alum, and the
Water

Water containing all the same Minerals with the Petrefaction (and marine Salt besides;) I suppose therefore the Water has no Alum neither. 2. I have had several thoroughly calcined Alum-stones, whose infusion would not strike purple with Galls, and some of the same Stone laid by, in time, would put out many saline Efflorescences in the Air, which Efflorescences dissolved in Water, the Solution gave not the least purple Colour of any kind with Galls; and yet the Stone upon Infusion afforded Salt enough. Now we know that both mature and immature Vitriols strike purple with Galls, but here mature Alum which tinges not with Galls, and if true Alum will not strike purple with Galls, no kind of it will, therefore our Spaw contains not Alum, but Vitriol. 3. There is very little Alum-stone without Iron-stone, or Marcasites of Iron, these give a purple Colour with Galls when calcined, and Non-attendance to this has made them take it for Alum, when it was Vitriol; for when the *Lixivium* of Alum-stone is let off from its Calx, they let it stand in its Receiver till it lets fall a Sludge or Sediment, then they presently let it off into another Receiver, where are the Alcaline Salts, for should it stand longer upon this Sludge or Sediment (called by the Workmen Slame) it would cut out and consume the Alum, now this Sediment is Vitriol. 4. Alum and Vitriol differ in their Taste, the first is of a sweetish rough astringent Taste, the last of a harsh, rough irony Taste; but our Spaw has the last when fresh, not the first; therefore it contains Vitriol not Alum. 5. When we procure this purple-colouring Salt from the Petrefactions, and crystalize it, it is Vitriol, but Alum Crystals are Octohedral, therefore ours is Vitriol not Alum. 6. The Crystals procured from the purple-colouring Salt in our Petrefactions, are dissolvable in about seven or eight times their Weight of Water, but Alum Crystals in not less than fourteen times their Quantity. The Quantity of Water in which Salts are dissolvable, is no bad Test of the Genus of natural Salt, Alum being dissolvable in no less than fourteen times its own Quantity; Marine Salt in three times and one fourth its own Quantity, Nitre in six times one third its Quantity, &c. 7. Air, Water, or any of the Salts, corrode Iron, or Iron-stone, hence the Ocre in the Bason and Stream of our Chalybeates, but not Alum-stone, therefore it is not dissolved, and cannot impregnate Waters. 8. But supposing our Spaw were impregnated with

Alum, and had its tincturing Property from it, yet a Mixture of Alkalies would prevent its striking purple with Galls; but though our Spaw has a hundred times the Quantity of Alkali that it has of Vitriol, yet whilst fresh taken up, it still strikes purple, therefore it is Vitriol not Alum. 9. Our Spaw opens Obstructions, cleanses the Vessels, and purges; but Alum purges up the Bowels and Vessels, clears not this last, but leaves the Mucus upon them, and contracts them, it also constricts the Belly; therefore the Salt of our Spaw is Nitre, and volatile Vitriol, not Alum^m.

20. But the Water fitting light and easy on the Stomach, no Vomiting, Sickness, nor Pain of the Stomach or Bowels, or Twitchings attending its use, we say this is the Vitriol of Iron and not Copper. 21. The Spaw being a whiter Pink Colour with Galls, than the Chalybeate, therefore the first has more calca-

What gives some a stronger Supposition of Alum in this Spaw, may be from a Paper in [Numb. 104.] of the *Philosophical Transactions*, giving the Affinity between natural Alum and Vitriol. That not only in *England*, but several other parts of the World, Vitriol is ordinarily found in the Vein, and sometimes in the same Parcel that yields the Alum, and may by several Methods be separated from each other. The Mineral of Alum (if mature) elixivated yields its Alum presently; if less mature, it requires previous Calcination; if very immature, it must not only be burnt, but long exposed to the Air, the Cause whereof is the very same, as that of the like Case in Vitriol. Alum like it being produced by the Sulphur acting on, corroding of, and coagulating some mineral Substance which usually partakes more of a terrene and stony, than metallic Nature, altho' Metal is often found to be contained in the Alum-stone or Ore. And that the Sulphur is the chief efficient and material cause of its Production, appears from hence, that many Alum-stones, as the Vitriolate, di-

stilled *per Descensum*, yield good Brimstone, and all Alum-stones or Ore, during Calcination, emit a Sulphureous Steam. A curious Naturalist gathered from the same Rock, within a few Inches of each other, Vitriol, Alum and Sulphur, all of them excellent and perfect in their kind. He says, that they are so nearly allied, that he has an Artifice whereby he can convert them into each other, which to all intents and purposes shall be the same with the Natural, these distilled into an acid Spirit with Copper or Iron, become good Vitriol, and Vitriol freed from its metallic Parts becomes Alum, and distilled yields a Spirit scarcely to be distinguished not only by Taste, but even by the nicest and most accurate Scrutiny, from that of Alum. And has often observed rectified Oil of Vitriol and Spirit of Sulphur to coagulate and become solid transparent Concretions, exactly like Alum crystalized, with which compared, he is persuaded, that the most judicious Eye, without the Assistance of the Palate would find little difference.

rious Earth in it than the last. 22. Since the Chalybeate Water both strikes a deeper Tincture, lets fall more Sediment, and retains its tincturing Property with Galls longer than the Spaw, we say the first is a more powerful and stronger Chalybeate than the last. 23. From both Spaws receiving a much deeper Tincture in Winter than Summer, by Galls, Sumac, &c. and also their retaining that Property longer in the first than last mentioned Season, we say they are strongly impregnated and more retentive of their Chalybeate Principle in Winter than Summer. 24. Since both Waters precipitate Silver out of its Solution in *Aqua Fortis*, then both contain marine Salt. 25. Since the Spaw when fresh or putrid, brightens Solution of Gold, and when stinking, is jet black with Solution of Silver, Sublimate, or Sugar of Lead, lets fall a stinking inflammable Sediment; it therefore contains Sulphur: But the Iron-stone abounding with Sulphur, and consisting of Vitriol, Sulphur, and Ocre, the first and third being corroded by all Salts, yea the Water it self, therefore the Sulphur is likewise from that; for Sulphur being the Cement which binds the Alum and Earth together in the Alum-stone, were this Cement dissolved and commixed with the Water, we must also have the Alum with it, seeing it's as dissolvable in Water as other Salts, when set at liberty from earthy Matter. 27. Since all Salts, and Water corrode and dissolve Iron, but not Earth, hence the Reason of Vitriol, Ocre, and Sulphur in the Spaw, but not Alum, whose Earth is a stony Matter. 28. Since Tincture of Nephritick Wood turns these Waters green by standing, Oil of Tartar, Spirit of Hartshorn, and *Sal Armoniac*, change it white, and occasion much Sediment, therefore these Waters contain much Nitre. 29. Seeing Solution of Sugar of Lead, makes the Water white, and throws down much Sediment, and also much white Sediment remains after exhalation of the Water, and separation of the Salt, we say it contains Earth. 30. But the Water turning Syrup of Violets green, and raising a strong intestine Motion with the acid Spirits, and the Earth when separated from its Salt, huffing, smoaking, and fermenting with Oil of Vitriol, Spirit of Salt, &c. we say this Earth is Alcaline. 31. But this Earth being white, exceeding Alcaline, even before it is calcined, and affording the same Kind of Salt with Lime-stone, we call it a calcarious Earth. 32. This Water being much more disposed to run into Putrefaction, and its Corruption much greater than that of other Wa-

ten of the like kind, we say it contains more Sulphur than any other we know of, wherein the Sulphur is imperceptible when fresh. 33. From the whole, we see that this Water contains both volatile and fixt Parts, the first are its Spirit, Sulphur, and Vitriol. The First is the meer Effect of the Dissolution and Mixture of several Minerals; the Second it has from five to nine Grains to three Pints, or a Quart of the Water; the Third, it has to about five Grains to a Gallon in the Spaw, and seven Grains to a Gallon of the Chalybeate. The fixt Parts are Nitre, and Marine Salt, which make up two Parts of the Sediment in the Spaw, for the Sediments remaining after Exhalation are in sundry Proportions (according to the different Seasons, and height or lowness of the Water) being as 1 to 162, and so on till they are as 1 to 204, the Salt to the Earth is as 2 to 1, the Marine Salt to the Nitre is as 1 to 16 or 18. The middle Proportion of the fixt Parts in the Chalybeate, is to the Vehicle as 1 to $274\frac{1}{3}$. The Salt in this last, is to the Earth as 9 to 5, the Marine Salt of this Water is to the Nitre, as 1 to 12. Now Vitriol is the Salt of the Ocre, hence it is ridiculous to make Vitriol and Iron or Ocre, distinct Principles. 34. We see also that when the Volatile Principles are largest in the Waters, the fixt are least, and *vice versa*, when the fixt are most, the volatile are smallest. 35. Seeing the Colouring and precipitating Property of these Waters with Galls, &c. is so quickly lost, together with their ferruginous Taste and Smell, their vitriolic Principle must be very subtle, consisting of very small and few Particles, therefore soon gone. 36. These mineral Spirits, and vitriolic Principles, being (as we shall see afterwards) the most medicinal and efficacious Parts of the Water, and so exceedingly volatile, then such as would expect and reap any great Benefit by these Waters as Alteratives, must repair to the Spring, and not depend upon them when carried to any Distance, or kept any Time. 37. Finding it impracticable to procure any Crystals of Salts from the Petrefactions (except a little Vitriol from some of them) tho' they are richly stored with Salts, the instantaneous Transition of their Colours, and the Diminution of the Salt in the Water by several Exhalations, Filtrations, &c. we see 1. The smallness of the Particles of this Salt. 2. That the Salt of Mineral Waters is not to be taken in a chymical but natural Sense. 3. How difficult it is to tell exactly the given Quantity of nitrous or vitriolic Salts in Mineral

Mineral Waters. 38. From the Waters continuing to purge, and purge better after both their mineral Spirit, and vitriolic Principles are quite gone, yea and after they are become *fatid*, and freshed again (having lost their subtilized Sulphur) we see their purgative Property lies not in their volatile but fixt Parts. 39. From the different Quantities of Sediment in these two Springs, and the sundry Proportions necessary for Purgation, we see that the purgative Property lies in the Contents chiefly, and not the Water. 40. Since the Salts purge when separated from their Vehicle and Earth, then the purgative Quality lies in the Salt. 41. Since this Water purges, and several others, both of the same, and different kinds, impregnated with the same Salt, but in a smaller Proportion are not purging, we see that the Reason why some purge, and others not, is not from the Genus but the Quantity of the Salt. 42. From the sweetish saline Taste of this Water, when the vitriol Principle is gone, its disposition to Putrefaction, and the separability of Sulphur from it, it is evident that this Salt comes the nearest to *Sal Polychrestum* of any artificial Salt. 43. From this Waters purging better in Bed than up, warm than cold, we see Relaxation promotes its Operation this Way. 44. Since this Water is so quick and powerful a Diuretic at the Spring, goes so suddenly and easily off the Stomach, but being of a slower Pace when drunk at a Distance or long kept, when it is a smaller or slower Diuretic, but more purgative, we see that this diuretic Property is greatly promoted, and next to the common Vehicle, is chiefly owing to its mineral Spirit and vitriolic Principle. 45. The very different Colours and some of them instantaneous and surprizing, produced by the same Things dropped into the Water, wherein the slightly burnt Petrefactions had been infused, shew either these Petrefactions to contain a different Sort of Nitre from that in the Spaw, or it is combined with other Principles, or the same Principles are differently ranged proportioned or modified, or the Fire has volatilized the same Salt. 46. Tho' the Earth of this Spaw when carefully and neatly got be white as Snow, yet when calcined, a Part of it being attracted by the Load-stone, and the rest of it agreeing in all respect with fine crude Lime-stone Powder, which produces none of the *Phænomena* of Alum-stone, where then is the Alum Glebe. 47. Since this Salt ferments neither with Spirits of Salt, nor of Hartshorn, we are sure it is neither acid nor alkaline,

line, but neutral. 48. Seeing by standing it loses its vitrollic Principle and Sulphur, then the longer it is kept the more alkaline it is. 49. This Water purging several when drunk at the Spring, that it operates not upon in the Town, with the same Degree of Exercise, it hence appears that the Loss of the mineral Spirit depauperates the Water and hinders its speedy Passage through the Body, as well by stool in some as by Urine in others.

Having now seen what the Principles of this Water are, and whence they proceed, let us next observe what are its primary medicinal Intentions, and how they are answered by its sundry Principles, and first being a chalybeate, it is *de-obstruent* or opens Obstructions whether in the larger or smaller Vessels, as in the Liver, Spleen, Mesentery, Kidneys, Uterus, *Ovaria*, Lungs, &c. Hence it is good in obstructed, diminished, depraved or irregular *Menses*, or Sterility from want of due Quantity of Blood brought to the *Uterus* or Obstructions in the *Fallopian* Tubes or *Ovaria*; beginning diminished Secretions in the Liver tending to a Jaundice, Inflammation, or Schirrus, or in the Spleen, therefore serviceable in the Hippo or other Disorders from a slow Motion of the Blood in, or a Distention of the abdominal Viscera, in Hystericks, especially, when 2. We consider its much stimulating, invigorating evacuant nitrous Salt, whereby it attenuates, gross, fizy, mucous Humours, gives a pleasant Pungency to the Vessels, thereby excites the Force of the Solids over the inactive slow moving Fluids, fits them for and promotes their Expulsion. Hence it is good in a Cachexy, beginning Dropsy, Cacochymy, too great Corpulency, fulness of the Vessels; therefore is excellent to prevent Apoplexies, Palsies, Lethargies and other Distempers from either a Plethora, or Sluggishness of the Fluids, and Laxness, Distention or Insensibility of the Vessels; and also to prevent Gout, arthritic or rheumatic Pains, with all other Diseases which may be occasioned from Idleness, Luxury, Intemperance, Diminution or want of some natural Evacuation: For the same Reason it is good in Headachs, chronic autumnal Agues in bulky unwieldy Habits, and in Worms of all Kinds, expelling the Mucus of the Intestines wherein they breed, lie and lay their Eggs. And in Asthma's from either a too great loading of the pulmonary Vessels, or their being stufed with flegmatic or fizy gross Humours; or in troublesome wasting Catarrhs, by giving the Defluxion a turn, and opening another Door for it, till the weakened Vessels have recovered their
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decayed Tone ; in habitual Costiveness of the Body, Distention of the Belly ; and finally to purge off the Dregs of small Pox, Measles, Agues, venereal Taints, &c. Add to these 3. Its alkaline Earth, whereby it sheaths, sweetens, and hastens the Expulsion of all acrid, acid or sharp Humours : Hence it is good in bilious Colicks ; Heartburn, Gripings, Hemorrhages by Stool, Urine, Vomiting or Spitting up Blood from the Lungs, occasioned by a Saltness and Sharpness of the Blood, troublesome tickling Coughs from the same Cause, or Convulsions therefrom, or any sharp tearing Pains ; or finally wherein the testaceous Powders can be of Use in chronic Disorders, this Earth will do Service. 4. From its mixture of Sulphur together with Nitre, it is eminently serviceable in the Scurvy either in the Blood or on the Body, and in almost all scorbutic Symptoms, as wandring Pains, Defecations of the Skin, Ulcers, corrosion of the Gums, emaciating of the Body, &c. 5. From the common Vehicle and cleansing attenuating Salt, it is exceeding good in all Disorders of the Stomach, stops Vomitings, Belchings, Hiccup, and cures its Flatulency, restores a good Appetite, and strong Digestion ; is good in stone, Gravel, mucilage or Sand in the Kidneys or urinary Passages, and in Stoppage or Heat of Urine, nephritic Colicks ; in Inflammations or Ulcerations of the Kidneys, Ureters or Bladder, in Thirst, Heat of the Stomach or Body, hectic Fevers and Palpitation of the Heart. Hence we see from their different Principle, mineral Waters are able to answer a great many and even different Indications, this Water justly challenges the Preference of all the yet known mineral Waters in *England* for a safe, pleasant, easy, cooling purge ; an Effect which neither Carriage, Keeping nor Petrefaction do diminish, and at the same Time it purges, it diminishes very little the other Evacuations, and at the same Time it reduces the Bodies bulk, its Drinkers sensibly recover Strength, because it rouzes a languid Circulation, encreases diminished Secretion, empties and braces up the relaxed and distended Vessels ; fills the Chyle for better Digestion, Secretion and Nutrition : Hence a plentiful Stock of nervous Juice, and greater Alacrity and Activity. It is a Water suited to all Ages, Sexes, and Seasons, even to Children, Women with Child and old People, and is a better Alterative or *Deobstruent* in Winter than Summer, and a stronger Purgative in the last than first.

As to Rules or Directions for the right Use of these Waters, having before given these from Doctor *Witty*, I shall be very brief here. And first, the Person that has any great Expectation or valuable Design to answer from these Waters, should make short and easy Journeys to them, in hot Weather especially, and not fatigue himself by over travelling, nor over heat his Body by riding Post, or drinking spiritous and hot Liqueurs, whereby he would stand a good Chance of a Fever to set out with. 2. When n got there it is adviseable that he begin not his Waters for one, two, or three Days, till he refresh his Body, recover his Fatigue, Stomach and Appetite, and the disturbed Secretions and Evacuations return to their natural, regular Channel. 3. If the Body is costive, or slow, or the Belly foul and loaded, let him take a Laxative of Rhubarb, *Glauber's* Salt, Cream Tartar and Lenitive Electuary, or some such Thing as his Physician shall judge most proper, to clear the first Passages and make Room and Way for the Water. But as to strong Purges of Jallap, Scamony, *Pillulæ ex duobus*, *Cochiæ*, &c. they are contrary to all both present and future Designs, they excite a Feverishness and Heat in the Body, cause Thirst, drain off the thinner Part of the animal Juices, thicken the rest, encrease Obstructions, spoil the Appetite, and weaken the Stomach and Bowels. If the Stomach is loaded and palled give a Vomit, or if the urinary Passages are plugged up with Gravel, Sand or Mucus, after the Belly is opened and cleared give some irritating Diuretic, as Tincture of *Cantharides*, Spirits of Nitre or Turpentine, &c. or if the Stoppage of Water be from a Contraction of the Strainers by a violent and long Stimulus, oily Softeners and Opiates are best. In too great a Fullness of Blood, a Vein may be opened to promote a more easy Circulation, perfect Secretions, and relieve the distended Vessels. But as to Preparatory Courses, I declare I have no Notion of them; for either the Water will do, or not do; if the first there is no need to tease and load Nature with Medicines, since they generally go but indifferently down, for they seldom miss to pall and nauseate the Stomach, diminish or destroy the Appetite and Digestion; if the Waters will not do, put the Patient either upon a proper Course of Physick, or ingenuously recommend him to other Waters more suitable to his Purpose. And what I say of Preparatives, the same I say of intermixing Medicines with the Waters, which cannot fail often of preventing the Success of the Waters wholly, or much
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and unnecessarily protracting the Use of them before they answer.

4. Let them begin with a moderate Dose, as a Pint or three half Pints, and encrease it after two or three Days till they find the Water answer, and come to a proper Quantity. Hereby the Water will find an easy Passage, gradually dilate the Vessels and open the Outlets, the Stomach not palled nor the Body disturbed, by throwing in large Quantities at first, which might fill the Body, dilate, distend, or relax the Vessels, mar or vitiate the Secretions, weaken the Stomach, throw the whole Economy into a Deluge, and be of very dangerous or fatal Consequence: After this let them encrease the Dose half a Pint daily, till they reach to seven or eight half Pints, and as the Spaw is not so much an Alterative as Evacuant, less will scarce answer the Generality of Constitutions; when it is used as an Alterative to remove some great Obstructions, the Chalybeate should be drunk, then a Quart is a large Dose. 5. Let them not swallow the Water down too greedily, but begin at six a Clock, and drink a Pint every Hour, so as it be over at nine a Clock, using gentle moderate Exercise between every Dose, as walking, riding in a Chaise or Chariot. Beware of strong and violent Exercise, which both directs the Water to uncommon Outlets, throws it too speedily into the Blood, and swells the Vessels, hinders its Operation by Stool and Urine, but is especially hurtful to such as are liable to Hemorrhages of any Kind. 6. Nor do I by any Means commend their Broath Breakfast, when the Stomach, which by all Means should be kept in Order, has been sufficiently palled with Water before; Broath then relaxes its Tone, and renders the Appetite more remiss, but green Tea of a middle Strength, braces it up again, keeps up Digestion, and being restraining and diuretic carries off the Remains of the Water. This change I advised several to (who could not get rid of their Water before four or five a Clock at Night) and had hearty thanks for it. 7. Such as have very weak and cold Stomachs may eat candied Ginger, candied Angelica or Orange Peel, or some such Warm Stomachic. 8. All improper Diet must be avoided, as Fish, (and yet it is strange to see how free they make with it here, as tho' this and not the Waters were to cure them, when more opposite Diet can scarce be imagined) Geese, Ducks, Cheese, Pork, Bacon, salt Meats, Salads, Cabbage, Carrots, Ale, Spirits, Drams, and whatsoever is of slow and hard Digestion, gross Nourishment renders

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ders the Blood thick and fizy, or encreases Obstructions. 9. Fly Idleness, day Sleeps or Naps, flesh Suppers, late sitting up, lying long a Bed in a Morning, Drunkenness, Tippling, Intemperance, &c. 10. Such as are asthmatic, epileptic, consumptive nephritic, hectical, &c. should use conjugal Pleasures with great Caution and Discretion, for as I have known the Use of this Water give some a pretty brisk Priapism, it was not improper to give this Hint. 11. Wherever an Encrease of the Blood's Quantity, Motion, and *Momentum* is to be dreaded, the Use of this Water must be sparing or refrained as in a *Diabetes*, Dyfentery, large Stone in the Kidneys, inward Impostumes, &c.

Now to touch a little upon some of the notorious Mistakes and Errours committed by the former Writers on this Spaw, for to mention them all or half, would spend much time to no Purpose. And *First*, *Simpson* tells us that a Solution of mineral Alum in common Water, or a Solution of Vitriol of Steel, have the very Taste of the Spaw; but it is not likely that either one or both should do it, one must give Water a sweet styptic Taste, the other a tart harsh inky Taste, the Spaw being impregnated with a neutral Salt and an alkaline Earth. *Secondly*, Neither *Whitby*, nor *Scarborough* Alum-stone (simple without Iron Marcasites or some of their dissolved Tincture or Earth, mixed with them, or lying upon them) calcined nor uncalcined, will strike purple with Galls, nor are we to expect it, since Alum is no more than the Acid Sulphur joined to an earthy or stony Matter, but Vitriol is this acid Sulphur joined to a metallic Body of Iron especially. Tho' I could find but little Alum-stone, that would not strike Purple with Galls, after some Hours standing, but the Reason was a vitriolic Substance joined with the Aluminous, for if a *Lixivium* of this calcined Alum-stone was set by clear, it would soon let fall a Sediment, called by the Workmen Slam, which is its Vitriol. 3. Neither the Clay of the Cliff, nor that fallen down on the Shore will ever strike Purple, with Tincture or Powder of Galls, or other Astringents, except it contain dissolved Iron-stone or its Marcasites. And as to the Lumps of Clay fallen down turning to Iron, as Doctor *Witty* asserts, it is impossible: Iron indeed it contain, as all strong, stiff reddish Clay does, which also hardens; but the Hardness of this is first, from the Nature of the Earth dried, and then from the great Quantity of Sea Salt, wherewith it is continually filled at every Tide which is afterwards backed and

and hardened by the Sun's Heat in Summer. But had he made as strict Observation on this, as on the Effects of the Spaw, he would have been convinced, when he considered first, that the greatest Part of this Clay falls from a greater Height in the Cliff, than the Minerals commonly lie in, they not extending seven or eight Yards above the Sands, and most of the other falling twenty or thirty Yards or more above this Level, where is only Clay and Gravel; and then of the many thousand Loads of Earth tumbled down in many Ages, few remain, being first soaked by the Winter Rains, then dissolved and crumbled in Pieces, and carried off by the Tide, which would be impossible were it Iron, or converted to Iron. 4. Neither do the saline Efflorescences on the Cliff contain a Grain of either Alum or Vitriol, for of these higher up, I gathered a Hatful, dissolved and infused them in Water, filtered the clear, boiled it to a *Lixivium*, set it by to crystalize, and it projected Nitre, and only Nitre. I tried those lower down the same Way, and I had mixt Crystals, partly Nitre and partly marine Salt, from the Tide at high Water, washing the lower Parts of this Bank. 5. Doctor *Tonstal* with no small Assurance tells us once and again, that the different Principles of the Sediment, and their Quantities, are these: In three Ounces and three Drams, there was one Ounce two Drams of Raments of Stone, of Nitro-aluminous Salt one Ounce six Drams, of Glebe of Alum three Drams; stone Powder and Salt are near equal. Strange that Men should thus confidently assert without convincing Proofs, and pledge their Faith for that which After-Enquirers must unavoidably find a Cheat. But what follows with the same serious Air is still worse; boil your Water, says, he, till half consumed, strain the Liquor and see what Sand you have; exhale the remaining strained Liquor to the Thickness of Oil, pour it into a wooden Vessel, and you have the nitrous crystals; exhale the rest of the Liquor, get its rock Salt by Solution and Filtration, exhale the filtered Water, and burn the Sediment in a Crucible, and you have the blue Clay or Alum Glebe; dissolve the first Crystals, exhale the Water, and you have more Earth, yea you will have little beside nitrous Stone. Before it was half Stone-Powder, half Salt; now it is all stone-Powder, worse and worse; where is now the noble Essence of the Spaw, that before was fit for the Cup of the King, seeing it is all Stone-Powder fit for the Bricklayers Trowel? Had I time to go through their Assertions it would be fine Business, but first let the Salts

be nitrous, vitriolic, Aluminous or marine, they should have crystalized them, this had been the Way to put the Matter upon a fair Issue, and convincingly ended the Controversy, the Crystals of all the mineral Salts unalterably and continually preserving their Figures; for Alum will never project Crystals of Nitre, or of any other Salt but its self. Marine Salt can never be metamorphosed nor compelled to change its Crystals for those of the Alum; nor will Nitre vitriolic Crystals, ever put on the Shape of Alum, Nitre or Sea Salt, &c. Say they, we did crystalize them; but how? In two or three Hours, or a Night's Time, upon the Earth. Quick Crystals indeed! It cost me ten Weeks to procure fine ones, but not like Doctor *Lifter's*, which quickly fell down in Dust, but mine will last Years if not exposed to Air. Because their Salts crystalized into *Stiria*, therefore these must be Nitre; slight Evidence indeed. So will Oil of Vitriol in the Winter time, the same will marine Salt and Vitriol, if there is either too great a Mixture of Earth, or a weak *Lixivium* exposed in too large a Vessel, or a Want of Salt to form full and regular Crystals, or exposed too little a Time to the Air; and I know of several Faults both in the Management of the Waters, and Errours in Exhalation, effectually to prevent obtaining Crystals from any Kind of Salt, as I am acquainted with some very easy Methods quickly and certainly to determine the Genus and Quantity of any Salt or Salts impregnating mineral Waters, but these are not my Business in this Work. But to give a faithful and true History of the Contents of our fundry medicinal Springs, and therefrom deduce their Effects simply, without any Flourishes, on the Causes remote or proximate of Diseases, with the State of Solids and Fluids in the Body, nor to spin out a long Harangue how these Principles act upon our Juices, and produce their Effects, the Gentlemen of the Profession are abler Hands to do this than I am, and it would be labour lost to others.

Several both formerly and now seem fond of Alum in Waters, and pretend to demonstrate it from chymical Experiments, but they know little of Metals, for their Alum taken out of the Heap of burnt Alum-stone, contained either Coal, Smoak, Vitriol or Marcasites of Iron, without which we find little Alum-stone. That there is constantly such a Mixture with the Metal of Alum is plain from that plenty of Sulphur, which is always found on the Top of the Heap in burning. Besides the Effects of medicinal mineral

mineral Waters are intirely opposite to those of Alum, one is opening, the other binding, one cleanses the Vessels, the other constringes or contracts them. *Holt* Waters are said to contain Alum, but examine them, and they only produce Nitre and calcarious Earth, without the least Mixture of any other Salt. 2. Instead of dedicating their Book only to the Royal Society, they should have sent up the Sediment of the Water it self, let them have separated its Earth and crystalized its Salts; this had convinced the World that this Spaw contained only Nitre and a little marine Salt; without either Alum or fixt Vitriol. But 3. To the great, great Objection, that one half, nay upon second Thoughts the whole Sediment was Nitrous Stone and Alum Glebe. I took therefore four Pints and a half of this Spaw, exhaled it very carefully and cleanly to one Pint, set it down, let it stand all Night, filtred the Water, dried the white insipid Earth, which weighed forty Grains. I exhaled the filtred Liquor again to half a Pint, let it stand another Night that all its earthy Parts might subside, poured it off and filtred it. I had eleven Grains more Earth. This filtred half Pint I exhaled next Day to one half, let it stand that Night, and filtred it next Morning, I had nine Grains more Earth; then I put a fourth of a Pint of distilled Water to the little filtred Liquor that remained, and exhaled it to one fourth, took it off the Fire let it stand till it settled, then filtred it and there remained three Grains of Earth; then I added six Ounces more distilled Water to the little remaining filtred Liquor, exhaled them away to about two Ounces, let it stand till it settled, then filtred the clear, and I had two Grains of Earth; then last of all I exhaled this filtred Liquor, and I had of a very beautiful white Salt seven Scruples and a half, the whole Earth obtained was about sixty six Grains, both Earth and Salt were ten Scruples sixteen Grains. Now supposing the earthy Parts of the Water were not so much united by the first Exhalation, as to form little Bodies larger than the Pores of the Paper, and so get off with the Salt, yet sure they had time enough to unite in the other Exhalations, so that what passed one Time might have been catch'd another. 4. But say the Dirt drivers, (it is *Tonstal's* own Phrase) had you dissolved this Salt and filtred it, you would have found more Stone Powder, and so a second and third Time, till nothing but Stone Powder had remained. Truly so I did, and Stone Powder I had each time, but what then? I knew the Spaw contained a natural mineral Salt and not a chimical, which is Salt only divested.

divested of its other Principles; for if it had been chymical Salt, as Spirit of Nitre, Salt, or Oil of Vitriol, who would have drunk daily four Scruples of this Salt for a Month, and not been killed in half the Time? It is one of the admirably wise and provident Contrivances of Nature that we have no such thing naturally as these chymical Salts, to extirpate the humane Race, but they come to us so tempered, as not to be mischievous but wholesome. I had also stone Powder at each Exhalation of the same Waters from *Buxton*, tho' *St. Annes* contains the finest brightest Salt and least Earth of all others I have met with; the same I found it in *Bath* Waters, *Bristol*, *Holt*, *German Spaw*, *Pyrmont* Waters, &c. Nay I went yet further, for I infused a good Quantity of Lime out of an old Chimney, in warm Water, let it stand two Days, then poured off the very clearest, filtered and exhaled it; dissolved the Salt in Water, filtered it again and there remained much Earth; this I did a third Time and had some Earth, so that this is common to all nitrous Waters, *Nitrum Muriale* it self not excepted. Let not then any sober ingenious Man quarrel with one before he has tried several others, and if he find the same thing common to all, let him not be prejudiced against one and not the rest. But when Men have sacrificed Honour and Honesty to Hypothesis and Prejudice, splitting upon such Rocks is unavoidable. To what sorry Shifts are they driven? I took some of the blackest of this old Lime which was pretty black with Coal Smoak powdered and infused it in warm Water; when very clear, powder of Galls turned it of an Opake blackish Purple, from the Vitriol in the Soot and Smoak; Tincture of Rhubarb turned another Glass of it Blood red from the nitrous Salt of the Lime. But you can obtain no Crystals from Lime Water; even the strongest *Lixivium*. Nor will any Nitre, except that which is calcined in the Stone, turn Tincture of Rhubarb red. Again, I exhaled two Quarts of *Scarborough* Water, it left seven Scruples and a half of Sediment, whereon I poured warm Water, filtered and exhaled it, and I had of very white Salt four Scruples eighteen Grains, which want only one fiftieth Part of two thirds Salt to one of Earth. But it took six sundry Waters before I could separate the whole Salt from the Earth, and I suppose the Gentlemen contented themselves with one Water. A certain Sign to know when you have got all the Earth from the Salt is, that then it ferments not with Oil of Vitriol nor Spirit of Salt, which it still does till then, and ceases not before. I lost eight Grains of the
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Sediment in this Operation, which must be Salt not Earth, for it is impossible the last should be lost. When I weighed the Cape dried carefully before using, and after I tried to procure more Salt from this Earth by pouring acid Spirits upon it till it ceased Fermenting, then put Vinegar to it, filtered it, and exhaled; a few Grains of Salt I had, but it was chiefly that of the acid Spirits incorporated with some Earth. 5. They crystalized the Salts of this Water into *Stiria*, and yet it is all Earth; strange, Earth crystalize! I wish they had given us its Figures, that we might have known whether different sorts of Earth will afford sundry kinds of Crystals like Salts. The Sediment is all Earth, and yet it is a nitro-aluminous Salt! It is all Earth, and yet the Spaw petrefies! Who ever saw Earth petrefy without any Salt? It is a petrefying Water, and yet it has an aluminous Salt! Who ever heard of aluminous Waters petrefying? I am really weary with such Contradictions and Nonsense. -----6. These Gentlemen never attended to the Loss of Salts in their Exhalations and Operations, for all Medicinal vitriolic and nitrous Waters lose considerably of Salts in their Operation, even so much, that without a comparative Estimate, a Man could not possibly know the given Quantity of these Salts in any Mineral Water, tho' he may know what any Mineral Water leaves upon Exhalation, but the volatile Vitriol and Nitre are both gone by this. Indeed marine Salt is more tame, nor will Alum take the Wing so speedily; and it is really ridiculous to expect a Chymical Salt should be left upon simple Exhalation, Dissolution and Filtration, which was what *Tonstal* sought, and quarrelled with *Scarborough* for, because he found not here a Body, or part of Matter dissolvable in Water, fluxible in the Fire, and so simple, that every part of it has the same Resemblance to the whole, being the most solid, compact, and fixt of any Body stript of its Earth, Flegm and Oil, but kind Nature produces none such; we are content to find a Substance dissolvable, and commiscible with Water, of a sharp, saline, pungent Taste on the Tongue, which Pungency gives a Stimulation, and is one great cause of the Waters Operations on the Body; as the Smallness, Solidity, and penetrativeness of its Parts, are the great Means of its being an Alterative. These poignant, penetrating, acid, active Spirits, are produced by Chymistry, from Sea Salt, Vitriol and Nitre, which

which quickly destroy the Texture even of Metallic Bodies, and burn and corrode as other Caustics. Animal Substances were by no means proper for the humane Species to swallow alone, therefore have we them naturally joined to a Portion of Earth, Flegm and Oil, to prevent their mischievous Ravage on our Fabrick; *Tonstal* will also have soft Alum-stone out of the Rock turn Purple with Galls, but let him first see that there was no Iron-stone, Marcasites, Ocre, or dissolved Vitriol in it or near it; if none of these, his Alum-stone Water will never turn Purple with Galls. He will have the Sediment of the Spaw in Oak Vessels, to be only the Wood abraded by the Acids. Then the Sediment of the Water in Bottles, is also the Glass abraded by the same Acids; for he says the first will burn in the Fire, which is a gross Mistake and Imposition. Again, Galls with Spirit of Nitre turns Infusion of Alum-stone Purple, which is equally false, but however this is better managed than the rest. This Spirit not being every Man's Pocket-piece, therefore not so readily detected, but if the simple Infusion of Alum-stone, turn Purple with Galls, what need of this Spirit? *Simpson* thinks he has unanswerably done with the Business, when he has told us that the Alum-Well at *Harrigate* turned Purple with Galls; but what is this to the purpose? a thousand Loads of those Concretions contain not a Grain of Alum, nor yet the Water. *Witty* says Alum dissolved in Water tinctures not with Galls, but is it like, when the Mineral Alum is loaded with the Alkali's of Kelp and Urine? And suppose the first should, the Experiment on this factitious compounded Body is not fair. The just way had been from Infusion or Lixivium of pure clean Alum-stone to have obtained Crystals, let these dry, then dissolve them in Water, and if these dissolved tincture with Galls, they might have thence drawn a Conclusion; but it will not. He says neither Infusion of calcined Alum-stone nor Iron-stone turn Purple with Galls, he is out in the last, for not only Iron-stone calcined, but Infusion of Steel-filings in warm Water turn Purple with Galls. And thus these Gentlemen are out in most of their Experiments and Assertions, scarce one in six of their Experiments will hold, nor seem they to have had the least regard to Truth in their Writings, being determined to oppose Dr. *Witty* right or wrong. As to what *Tonstal* says in his Dedication to the Royal Society, viz. That
Scarborough

Scarborough Spaw, tho' a petrefying Water lays no stoney Crust on things put into it; for it runs out of the South, and in a direct Line Southward, a Mile or two distant beyond the great Mountains, there is a Hydrophylacia, a stately Lake abounding with Fish; here is the Spring-head of *Scarborough Spaw*. It passing forthwith through the Root of those stoney Hills, first dissolves the Stone, and hath fully performed the Act of Corrosion on it, before it come to the Cliff. This being done, it then corrodes Alum-stone, and in this second act of Corrosion, the Spaw appears at the Bottom of the Cliff, after the Corrosion is compleated, which happens in a Day or two. Now if this be ingenuous Dealing, or if it is not the last Refuge of a forlorn Hope, a pitiful Shift to support a sinking Hypothesis, a wretched Pillar for a bad Cause, let the World judge. Let us take it as it lies, 1. A petrefying Water incrustates nothing laid in it, if it run out of the South; a nice Observation to hold. 2. This Hydrophylacia or Lake, is the Head of *Scarborough Spaw*, it passing forthwith through the Roots of those stoney Hills; we shall presently find this a willful designed Mistake. 3. It dissolves the Stone, and hath fully performed the act of Corrosion on it before it comes to the Cliff. *Gratis dictum*. Did he, or had he an opportunity to see and know this? 4. When it has justly performed its act of Corrosion on the Stone, *i. e.* when the acid Salt or Sulphur is so much saturated with the Alkali till it ceases to be an Acid, or has its poignant Parts all sheathed and shut up in the Stone-powder; then when it comes to the Cliff, it corrodes the Alum-stone, after which second Corrosion the Water appears at the Bottom of the Cliff, in two Days time. The Acid was spent, yet here is a new Acid, but whence? the first was in the Water of the Lake, and yet it abounded with Fish, tho' we know Fish cannot live, far less thrive and breed in vitriolic or sulphureous Waters. Now this Acid must either be Sulphur or Vitriol, for we know all fresh Water contains Nitre, and without Nitre no Vegetation, therefore Nitre it cannot be; it is astonishing to see Men run themselves into such Dilemma's. But let us read Grammatically, and it is thus. A Mile or two distant beyond the Mountains, is a stately Lake of acid corrosive Water, in which Fish abound; this Lake is the Springhead of *Scarborough Spaw*, it passes directly through

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the Roots of the stoney Hills, (a Mercy it flows not over their Tops) it corrodes first the Stone in the Root of those Hills, (you find it had its Acidity in the Lakes, for it meets with none in the Road, that we hear of) till its saturated, then it eats the Alum-stone in the Cliff, (an unmannerly hungry Water indeed that must have two belly fulls in a rapid Course of a Mile or two;) after this it halts and breathes a Day or two under the Bason of the Spaw, so springs up. The Story is this, There is a very large Collection of Water from all sides of a Range of Mountains, consisting chiefly of Lime-stone, and round this Mer; this Mer has no Inlet, but discharges such a large Rivulet, as keeps several Corn Mills going, besides a considerable waste Water, even in Drought; but he tells us not a Word of this Outlet, but would have us believe that this whole Mer is discharged by the Spaw, and has no other Drain. Nor 2. Can the Spaw be possibly supplied from this Mer, the Soil being very strong and thick, scarce allowing so remote a Percolation, the Mountain being at least a computed Mile thick, and a Cement of Clay, Gravel, Lime-stone, Iron-stone, Alum-stone, in different *Strata*. 3. Nor is the Water under any Compression or Restraint, that it must necessarily force its way through so stiff and close a Passage, having an easy purling Descent the whole way between this Mountain and Town to the Sea. But 4. Allowing its Percolation, then the small Range of little sandy dry Mountains on the South of this Mer, are not sufficient to afford half this large Reservoir and Current of Water, with no other Supply but from those little Hills which have their different Springs on their Path Sides, therefore a considerable Contribution there must be from this one Mountain, which is double the Bulk of all the rest round this Lake. 5. This very Mountain empties several brisk Springs from its South Side into this Bason, and their Water is neither Acid nor Petrefying; it is full of Flags, Rushes, Grass, &c. and no Indications of Petrefying. The Mer is above a Quarter of a Mile long, and broader in some places than others; and supposing its Water were Acid, how is it possible that a Spring glutted and loaded with such an alkaline Substance as Lime-stone Powder should yet be capable of dissolving Alum-stone; or if it did corrode the Alum-stone, what becomes of the Alum, for a thousand Tun of the Spaw will

will not afford one Crystal of Alum? 6. And supposing the Water was or is of a petrefying Nature, what is that to the Drinkers; are not all Waters from Lime-stone or Iron-stone the same, *Bath, Bristol, Buxton, Matlock, &c.* and even this favourite *Harrigate* Alum Well, which is a Chalybeate, has hundreds of Loads of Petrefactions or Concretions under and all round its Bason? and must *Scarborough* only be poysonous, and they wholesome? Do not the numberless excellent Cures done by the *Bath* in many Ages proclaim the contrary, and prove it a kind and noble Gift of the wise and beneficent Author of Nature? But again, supposing them all petrefying Waters, who ever found Alum in Petrefactions. I never saw any Salt besides Nitre, and sometimes Vitriol in all those I examined, which are not a few; nor did I ever see warm Waters, or any Waters in a brisk Motion, or with a full Quantity of Element, or in a great variety of different Mixtures, leave any Petrefaction, or tendency to it. *Knareborough* dropping Well, which of all others is the most Lapidescant, yet has no Petrefactions in its Current, but only when its Body of Water is broke, and some Drops falling or dribbling slowly down, petrefies, and that in Winter only. But in the human Body there is Heat, a perpetual and brisk Motion, an Action of the Vessels against the Fluids, a compound of sundry Mixtures in the Blood, a Change of Nitrous Salt, and without Nitre no real Petrefactions, and Sea Salt is the only Salt that escapes unchanged in human Bodies, therefore Petrefactions from those Waters cannot possibly happen in the Body.

I know the general Clamour and Outcry against these Waters by Chimists, was chiefly raised from their abounding so much with earthy Parts; these stop in the secretory Ducts of the Kidneys and Liver, and so occasioned Gravel, Stone and Jaundice: But they do not give us one Word of the Reason of this Stoppage, nor how to prevent it, if true, the Design being to find Fault right or wrong. It is undeniable that there are earthy Parts in the Blood, as also that these may occasion stoney, chalky, or other Concretions in all parts of the Body where they stop and gather; but the Reasons why they are more apt to stop in the Kidneys than other Parts are probably 1. From a lapidific Disposition of the Body and Juices, whether hereditary or contracted.

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Thus we see some particular Families and Constitutions are more liable to this Distemper than others. 2. The emulgent Arteries turn off from the *Aorta* directly at right Angles, and having only a little way to the Kidneys, they are immediately divided into innumerable Branches and Ramifications, and these have sundry Turnings, Windings and Circumvolutions. Now the Blood sent off by the Emulgents, is very different from that which keeps its straight Course in the *Aorta*, the first containing the more watery, light and earthy Parts, whose Particles recede more from those of a spheric Figure; for if we attend to Hydraulic Laws, we shall find that the more the Particles of any Liquor are moved in a Canal, and the more their Motion enclines to a straight Line, the more solid and spheric are its Particles, but the more angular, light and improper, are thrown to the Sides, which is that part of the Blood thrown out into the Emulgents, whilst the more Spheric and Globular keeps the Axis of the *Aorta*. 3. Add to the anatomical Structure of the Parts destined for the Secretion of Urine, for from the Pelvis of the Kidney to those places where the Urine is immediately separated from the Blood, we find them all that way consist of little Bags, Papillæ and secretory Tubes, and probably the whole Texture of the Kidney consists of such; so that the Urine before it is propelled by the small *Tubuli*, out of one *Follicle* into another to the *Pelvis*, meets with several stops and delays, besides the Slowness of the Blood's Circulation here, beyond what it is either in the *Aorta*, or emulgent Arteries, for the Velocity of the Blood at the Orifice of the separating Canal, being as the Number of Plications in the complicated Artery, the Viscidity of the secerned Matter will be as the Number of Plications in the complicated Artery. 3. The more the Blood's Quantity is encreased, the more are the Vessels distended, and the more they are dilated, the less is their elastick Force, and the larger the Secretion of the serous part of the Blood. Again, the sudden decreased Quantity and Motion of Blood, strengthens the Vessels, lessens the fluid Secretions, but encreases the more viscid, therefore will the more serous Parts be first discharged by Urine, but the more gross and earthy retained longer, and be cast off afterwards by the Emulgents. This is plain from the Drinkers Urine, which at first is clear, and scarce smells or tastes different.

ent from the Water, but afterward, is flaming high coloured and thicker. From this Reasoning, such as are liable to the Stone or Gravel, are directed to the following proper Helps; first, drink sparingly of the Water, at first setting out especially, so that the Vessels not being too much dilated, its watery parts be not too much separated and expelled before the Earthy, but both be gradually discharged together. 2. Since by many Experiments we see that Acids dissolve the Precipitations of those Waters, the Drinkers might use some proper Diuretic acid, as dulcified Spirit of Nitre. Or 3. Use such Medicines as direct those stagnant or viscid Parts to the *Uropeia*, and invigorate the secreting Vessels, and hasten the Expulsion of any foreign Matter lodged in them; such are several of the natural Balsams, as Turpentine, Capivi, and Millepedes, or the gentle stimulating Salts, as of Amber, Tartar, &c. but especially *Tinct. Cantharid.* which will sweep the Kidneys of all Sludge. And a little Tincture of Rhubarb now and then will warm, strengthen, and cleanse the Intestines; but it is wrong to give *Tinctura Sacra*, for tho' it warm and strengthen, yet it encourages the Piles, which all brisk purging Waters of themselves are apt to do.

We have still somewhat more to recommend repairing to this Spaw, and that is the Convenience of Bathing in the Sea. The Subject of cold Bathing cannot be better treated of than by Dr. *Wainwright* in his *Non-naturals*, and Sir *John Floyer* and Dr. *Baynard* in their Treatises of cold Bathing; the first gives us the Theory, the two last its Effects from much Observation and Experience; these Authors highly deserve the Perusal of all that regard their Health. The first tells us, that when the Mercury stands highest in the Barometer, our Bodies sustain (supposing the Area of the Skin to be fifteen Feet) a weight of Air equal to 39900 Pound Troy-weight; but a Person two Foot under Water sustains a Weight of Water added to that of Air, equal to 2280 lb; for 2 the Number of cubical Feet of Water, is equal to $152 + 15$, the supposed Number of Square Feet on the Surface of the Body is = 2280 lb Troy. The Effects of this Pressure are, 1. To straiten the Vessels and dissolve the Humours. 2. To remove any viscid Matter adhering to the Sides of the Vessels. 3. To scour the Glands by fitting the Humours to pass them and be evacuated, and to squeeze out any obstructing Mat-

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ter that sticks to the sides of the Vessels, and render the Motion of the Fluids more free and easy. 4. It mightily encreases the Quantity of Blood in the Brain and Viscera; hence a greater Quantity of Spirits are generated and moved with greater celerity through the Nerves. 5. The Blood being thrown upon the *Viscera*, occasions a greater Quantity of Urine, *Bile*, *pancreatick Juice*, &c. to be separated. 6. What hindered Secretion in the Reins, Liver, Spleen, Pancreas, Mesentery, &c. will be hereby removed, and Obstructions cured, if not too chronic and obstinate. On the first, second and third of these Accounts it is, that cold Bathing cures Itch, Scurvy, Leprosy, Elephantiasis; it is from the third and fourth, that it cures Palsy, Madness, Melancholy, and the Bite of mad Dogs; from the fifth it cures Stone and Gravel. From the sixth and rest, it cures Cachexy, Jaundice and beginning Dropsy. It is from the Contraction caused, that it stops Hemorrhages, Gonorrhœa, Fluor albus, Frigidity, Infrequency and Impotency to Venery; hereby also it cures Rheumatism, Gout, Sciatica, Lameness, and a nervous Atrophy. As the cold Bath is moist, it softens, relaxes, and makes all the parts of the Body pliable; hence a vast Quantity of perspirable Matter is carried off. To these Diseases *Floyer* and *Baynard* add œdematous and other Swellings, Rickets, hypochondriac Illness, frequent Colds catching, painless Inflammation of the Eyes, or other recent Inflammations on the Body, Menses obstructed, Sweat stopt, Spleen swelled or indurated; Pustules on the Body from obstructed Menses, prevents hereditary Diseases, cures Deafness, Lethargy, Faintings, Gripes, Cramps, Vomiting, Belching, want of Sleep, *Mala Stamina*, King's-Evil, Asthma, Stiffness, Weakness, Blindness, Numbness of the Limbs, loss of Taste and Smell, cures Incontinence of Stool and Urine, *Hemiplegia*, loss of Speech, Distortion of the Mouth, Weakness of the Muscles, Tremors, Coagulations of the Blood, and blackness from Bruises, Falls, Blows, &c. Ephemera's, Hectics, Malignant Ulcers, Stranguary, Dysury, Vertigo, Incubus, Convulsions, Opiates, Mandrakes, dimness of Sight, Excoriations; it prevents Fevers, feeds thin Bodies, gives Appetite and Digestion, cures Rheums of the Eyes, weak Eyes, with many more Diseases. And the Rules to be observed in Bathing, and the Diseases wherein it is hurtful, the Reader will find them at large. Now Sea Water containing much Salt (*viz.* near

near one twentieth part) will give a greater Pressure, a more sensible Stimulus, and stronger Contraction, therefore proportionably more prevalent in the above Cases, and more certain Relief may be expected from it, as the Stimulus, Pressure, and Contraction are so considerably greater, and the Water being liquid and moist, moistens the Skin after, relaxes it, enters the Pores, its Salt attenuates the viscid, fizy or stagnant Juices in the small Vessels of, and immediately under the Skin. But there is so much caution to be used in venturing on Bathing in the Sea, that it ought never to be done without good Advice, which I have no room for here, nor can any but those present be competent Judges.

I made also the following Experiments on Sea Water; Solution of Silver turned it instantly milk white, but it presently precipitated the Silver in a white Calx; with Solution of Sublimate it was a pale clear. Solution of Sugar of Lead changed it milk white; and a Precipitation followed. With Oil of Tartar and Spirit of Hartshorn, it became white and crudled. I had a large Stone Bottle of Sea Water sent me in *January*, it being kept a Month well corked, pitched, and a Bladder tied upon it, stunk not, but with Spirit of Hartshorn turned of a fine transparent White, which soon lost its Transparency and became thick, let fall a large white Sediment, which after four Days standing lost its Whiteness, turned clear, and all fine Crystals of Salt lying on the Bottom and Sides of the Glass Decanter. The Water poured off turned no more white with either Oil of Tartar or Spirits of Hartshorn, nor afforded any Precipitation except with Solution of Silver. When the Sea Water had stood a Week, after opening (tho' I corked it close again) it became intolerably fetid, nor turned it white with Spirit of Hartshorn, as before; it weighed also 154 Grains in a Pint heavier than common Water, which had stood in a Lead Cistern four Days, that is, it weighed 34 Grains in a Pint heavier than when new taken up in Summer at a high Tide; and the common Water weighed eight Grains in a Pint heavier than distilled Water which had been kept six Months. —A great part of the first Sediment, or Crystals, on pouring off the Sea Water, and adding distilled Water became Earth, and discovered a strong hard petrefied Substance on the Bottom and Sides of the Glass. When this Water had continued six Weeks in the Bottle,

Bottle, it stunk not much short of *Harrigate* Sulphur Water, was of a deep greenish blue Colour. When this first white, then crystal-like Matter precipitated by Spirit of Hartshorn, was washed out with the distilled Water, it appeared chiefly Earth, for after Filtration, that in the Cap being dried was very white, fermented strongly with Acids, and was in all respects the same with the Earth obtained from the Spaw by Exhalation. The filtered Liquor being exhaled to a due Quantity, was very green, and set to crystalize, afforded only some small crystals of marine Salt. A Quart of Sea Water exhaled, left of very white Salt twenty eight Penny-weight and a half, that is, one twentieth part short of an Ounce and a half. So the Salt is to the Vehicle in this rainy Season as 1 to $22\frac{1}{4}$. Some of this Salt obtained by Exhalation, being dissolved in distilled Water, changed not with Spirits of Hartshorn or *Sal Volatile*, but continued still clear, as at first, when the Air contained in the Lumps of Salt were got off. Hence 1. Both the Disposition of Sea Water to such intolerable Putrefaction, and its Salt fermenting with Acids, shew it to be highly Alkaline. 2. This great Disposition to Putrefaction even in the coldest Season, tho' thus plentifully loaded with Salt, shews the Necessity of Tides and Winds to keep its Motion, that it stagnate and putrify not. 3. Since so great a Body of Water as the Ocean is, could not possibly even by Tides and Winds (the first reaching only near the Coasts, the last causing a Motion only on the Surface) be preserved from Putrefaction without Salt; but we find by Experience, that the finned Tribes cannot live in any Water so highly impregnated with the other Salts, and also that Vitriol and Alum fertilize not the Earth, but impoverish the Soil, therefore it was absolutely necessary, that it should be this Salt and no other. 4. That since Spirits of Hartshorn and *Sal Armoniac*, turn this Water first white, then cause a Precipitation, therefore it contains Nitre. 5. Since this Nitre exhales either by keeping the Water long, or on boiling the dissolved and filtered Precipitation, and since the Marine Salt dissolved in Water turns neither white nor precipitates with Spirit of Hartshorn, therefore it is a volatile Nitre, which may either be necessary for preserving the Inhabitants of the Ocean; or several other Purposes.

6. Since

6. Since the fixed Salt of the Sea is to its Water as near as 1 to 22; then in Bathing, the Pressure of the Sea Water upon the Bodies Surface will be the Twenty second part greater than that of cold fresh Baths: and as the Pressure is greater, so must likewise the *Stimulus* from the contained Salts, and Contraction from the Chillness of the Water. 7. Since the Particles of Nitre are so very small and volatile, then in Bathing they are disposed to enter the Pores of the Skin, mix with the *sub-cuticular* Juices, and be of eminent Service in thinning and dissolving thick or fizy Juices, and be of no small benefit in provoking Urine.



Of Malton-Spaw.

HAVING dwelt so long on *Scarborough Spaw*, a great Part of my Work on the rest of this Class, will be thereby anticipated, they being all of the same Nature, and differing only in some Circumstances, as to a greater or lesser Impregnation with mineral Principles, or some Differences in the Kind, Proportion, Mixture, Volatility or Gravity of those Parts. This Spring lies at the West End of *New-Malton Town*, between the Road that goes from this to *York*, and the River *Darren*, about twenty five Yards North of the last, and between sixty and seventy from the Road, under the Hill, whose perpendicular is about fourteen Yards. It is in a Close belonging to the right honourable *Thomas Lord Malton*; the Hill above it consists chiefly of white Free-Stone, and a bastard Flint, till you come to a Place called *Broughton* a Mile and a half off, where is a Rock or a thick Bed of the richest Iron-stone in *Yorkshire*, but lies neglected because of the great Distance of the Place from *Coal*. This Spring rises up into a Bason, three Foot one third long, three Foot one sixth wide, and three Foot deep. Its Walls leak the Water as it rises, so that it seldom runs over any Quantity, therefore it is a Kind of stagnant Spring for tho' the Waters rise up clear in the Bottom, yet from the Bason being three or four Days in filling, the Water has lost its mineral Spirit, is muddy, full of Ocre, and lies heavy on the Stomach. But empty the Receiver and drink the Water as it rises up, it is clear, of a ferruginous Saltish Taste, goes soon off the Stomach and Body, is of brisk Operation and more agreeable to the Appetite, its common Dose being from three Pints to three Quarts, where the Stomach is palled and foul, the Water Vomits the first Day or two, having then cleared the first

first Passages it works its Way through Intestines and Kidneys, operates pleasantly by Stool and Urine. The Authors that have transiently wrote on this Spaw, (as far as I find) are Doctor *Simpson*, and Doctor *Lister*, * I am informed that one *King* wrote on this Spaw only, in the Reign of King *James* the second, but have not been able to procure it, nor do I find any Notice of it in the *Philosophical Transactions*, or our Catalogues. Empty the Bason, and the Water that springs up Weighs little heavier than common Water. It colours the Drinkers Faces and Mouth a thorough black in little Time. It perfectly cured its present Keeper of an Asthma and spitting of Blood, which she had laboured under for five Years without the least Relief, before she came to it; she was brought as low as was consistent with Union of Soul and Body. It neither encreases by the greatest Rains nor decreases by the longest Drought, it is always covered with a reddish Scum. Solution of Gold turned it of a whitish yellow, Solution of Silver Pearl with a brownish Cloud in the Middle. Solution of Copper of a whitish blue. Tincture of Rhubarb of a very dark brown. Solution of sublimate of a dark white, with a Pellicle. Solution of Sugar of Lead of a

* *Hydrologia Chimica*, p. 134, 135. This has the like Ingredients with *Scarborough Spaw*, and probably the same Operation. Its *Phænomena* with Galls, Oil of Tartar, Spirits of Hartshorn and Vitriol are the same with the other. He distilled this Water in a Glass Retort with a gentle Heat, after the Water was come off, there remain'd a pale coloured Sediment, as in *Scarborough Spaw*, an esurine aluminous Salt, which passing through or by some mineral Beds of Iron, licks upon it, and carries some small Touches thereof, and also washing some Stones in its current rases off some of them, which being wrought off by the esurine Salt, it hides it with its self in the Pores of the Water, and is what remains after the Salt is washed out of the Earth, has no Taste nor is dissolvable. In short, to speak of its Virtues and Use, is only to repeat what I have said on *Scarborough*, they being in all Respects the same, only this is

somewhat more sluggish, and this may be helped by draining the restagnant Water, and improving it. Says *Lister*, in the inky Spring near *Malton*, there is the same Lime-stone Salt as in *Scarborough*, this Water affords also Ocre of Lime-stone, and a little plumose Alum, the same Matter that may be extracted from burnt Sulphur, and the macerated Pyrites. From our Experiments we found it thus, viz. the Ocre falls first of all in the warm Water, then presently Scales of Lime-stone subside, and the Water boiled away to a very small Quantity, you may with a Filtre separate some Hairs like Plumose Alum, this is the genuine Product of the Pyrites, at last you have Crytals of Lime-stone, Nitre. If you are nonplus'd with a confused Mixture of small Crytals, rub the Vessel with a little Alum, and you shall have larger Crytals very beautiful, &c. p. 34, 35.

light white with a Pellicle, and much brownish white Sediment. Oil of Tartar of a brown Colour above, and a pearl blue, then cruddled and let fall a Sediment. Spirits of Hartshorn whitish; Spirits of Vitriol clear above, much yellow Precipitation under it, and below that at Bottom white cruddled Matter. Syrup of Violets turned it green with much Sediment. Tincture of red Roses a deep blackish blue. Tincture of Red *Sanders* a pale white. Tincture of Fustic a very muddy yellow. Tincture of Brasil-wood, a muddy yellowish brown. Tincture of Logwood a Mazarine blue. Tincture of Galls first muddy white, then purple, then whitish purple, lastly it cruddled and let fall a Sediment an Inch high in the small Glass, with a beautiful transparent crimson Colour above. Spirits of Hartshorn added to this changed it to a fine green; this will cause this Water with Galls to precipitate presently, and the Liquor will be a clear greenish Colour. Green Tea changed the Water purple with a very large Precipitation. Tincture of Sumac a transparent purplish blue with much black Sediment. *French* Brandy a blackish clear. Seven Pints of this Water exhausted, left of a reddish brown Sediment like Iron rust three Drams, and a half, two hundred and thirty Grains. When I had carried a Pint of this Water sixteen Miles, *viz.* to *Scarborough*, let it stand all Night, and a Pint of the last taken up at nine a Clock at Night, corked well and let stand till next Morning, then compared the two. *Scarborough* Water with Solution of Gold was of a bright yellow, *Malton* of a darker yellow. Solution of Silver changed the first of a very clear white, with much Precipitation, the last of a blueish white, the Liquor cruddled and let fall some Sediment. With Tincture of Fustic the first was a transparent yellow, the last a cruddled dark yellow. With Solution of Sugar of Lead, the first cruddled and let fall much very white Sediment, the last much Sediment whitish brown. With Tincture of Brasil-Wood, the first was a light red, the last a deep Ocre Colour with much Sediment. With Tincture of Galls, the first was a yellowish brown at bottom, blue at top, much cruddling, and then a small Sediment, the second was a very deep crimson, and one third of the Glass-full a purple coloured Sediment. With Tincture of green Tea, the first was only the Colour of the Tea, the last a deep purple with much Sediment. With the *French* Brandy the first was a blackish purple, the other darker. The Sediment of *Malton* Water was reddish, that of *Scarborough* white. When this Water
which

which I carried from *Malton*, was set on the Fire to Boil, arrived to the greatest Heat, and boiled sixteen Minutes, yea two thirds exhaled, yet it still struck purple with Galls, Sumac or Tea. Yea when a Gill of it had stood sixteen Days in an open quart Bottle, that struck purple with Galls; nay the Sediment of this Water put into common Water warmed, when they had stood till the Earth was subsided and the Liquor perfectly cleared, the last struck purple with Galls upon five Hours standing. The Sediment of *Malton* Spaw fermented neither with Spirits of Vitriol, Sulphur, Hartshorn, *Sal Armoniac*, nor *Sal Volatile oleosum*. The seventh Infusion of boiling Water poured upon this Sediment (when I had obtained all its separable Salt from it) still turned of a deep muddy purple with Tincture of Galls. Tincture of Galls changed the filtered Liquor to a deep mazarine blue, but it turned syrup of Violets neither green nor red, but left it a light muddy blue. The Water of the *Lixivium* exhaled, the Salt was of a grey Colour, the dried Earth was reddish like Sinoper; it smelled and tasted still rank of Iron; Syrup of Violets in an Infusion of this Earth in twenty four Hours became of a greenish blue; Galls changed another Part of this Infusion to a deep bright Purple. The Salt neither fermented with Acids, nor Alcalis, but Spirit of Salt turned it green, the Load-stone attracted the calcined Earth briskly. The Salt neither crackled nor flew about on a red hot Iron, but swelled huffed and burnt to a spongy dry Matter. Tincture of Galls put to a Solution of a very little of the Salt. the Liquor was of a fine deep mazarine blue, and precipitated a black Sediment, the Liquor above was blue. Some of this Salt kept close corked up a year, then dissolved in distilled Water half a Dram to three half Pints, after twenty four Hours standing with the sundry Mixtures, it was thus, with Solution of Silver, a dark Violet purple, with Tincture of Rhubarb a deep yellow; with Syrup of Spirits of Hartshorn green and clear, with Syrup of Cloves blackish. With Tincture of Logwood bluish purple, no cruddling. With Tincture of Galls fine clear Violet purple. Solution of *Scarborough* Salt in distilled Water, with Tincture of Logwood was first red, then yellowish black. With Tincture of Galls was whitish; with Solution of Silver was a fine light purple red. With Tincture of Rhubarb was a light yellow, with Oil of Tartar clear, then let fall a downy Sediment, &c.

Under

Under the Bafon, and betwixt it and the River is very much Clay, and between the Surface and fifteen Foot deep is a prodigious Quantity of the Selenites and Marcasites of Iron (called there Cat Heads,) with some other Minerals which my Informer (the ingenious Mr. Carr of Malton) could not tell what to make of. It is called Selenites, not because it resembles the Moon either encreasing, decreasing, or at full; but being obverted to the Rays of the Moon in right Angles, it represents its Image in all its Phases, especially at full, the same as a Glass Mirrour, and so it will do other Bodies; therefore it is more properly called the *Lapis Specularis*. Tho' there are sundry Kinds of this Stone, yet ours has two of its sides broader and more depressed, opposite to one another; with four lesser Sides, so that its Hexangular, its thinnest Sides are divided by a Ridge, the whole constitutes an inequilateral Parallelogram. It is no less beautiful than useful, for as it flits or cuts (like Cheese) into very fine thin *Laminae* or Plates, so before the Invention of Glass, the Ancients used it for Lanterns and Windows; and both before and in *Pliny's* Time Bee-hives were made of it, that the curious might see the Bees working their Combs and storing up their Honey; it also served for Mirrours; besides a multitude of medicinal Uses assigned it by *Galen*, *Cerutus* and *Aldrovandus*. The *Italians* at this Day calcine it, and make their curious Images, Fret-work, and beautiful counterfeit Tables, like Marble, inlaid with precious Stones, in the Forms of Animals and Plants; the Art of making which we have in *Kircher's Mundus Subterraneus*. Such as want further Satisfaction about the Selenites may consult the ingenious Doctor *Plot's* History of *Oxfordshire* Ch. 5. Sect. 3. to 16. I shall only add that these Stones here bear an exact Resemblance to the Crystals of the Salt of this Spaw, when obtained large from a good Quantity of the Salt cleared from its Earth.

From this short History we may gather 1. That it is surprizing to find this Spaw in no better Repair, lying so very near a large and ancient Borough Town, which sends two Members to Parliament, has two Market Days Weekly, and has given the Title of Baron to so many noble Lords, both in the *Saxon* and *Norman* Times, and some tell us that this is the very *Camulodunum* of the *Romans*. 2. Since the Water of this Spaw is so very clear, sparkling and spiritous at bottom, as it springs immediately up, sits so light upon the drinkers Stomach, goes so readily and easily off the Body,

Body, enlivens and strengthens it so much, yet so muddy and unpleasant to both Taste, Sight and smell, lies heavy upon the Stomach, and goes off the Body slower when taken out of a full Basen, this is sufficient Evidence of the Inconvenience and Mischief of too large, but especially of a leaking Receptacle whereby the most volatile and efficacious Parts of the Water are lost; the Vehicle too weak in this depauperated State to sustain the fixt Parts which soon begin to precipitate and muddy the Water. All which may easily be prevented at the small Expences of pulling down the old Well, cutting a Level from this to the River, laying down a small Stone Basen to receive the Water, which may not hold above two Gallons, for the smaller the Receiver, the better, lighter, more passable and medicinal is the Spring, and indeed considering its Slowness, and the Injury the open Air does the Water, the Basen can scarce be too small; the only Objection against this is, that if there were a Demand for the Water, the Basen being so small, much would be lost, and a Supply could not be got. But this is easily answered by laying down a pretty large square Trough, at the Side of the Receiver, and fitting a very close Stone Cover to it, with a Ring and Staple in the Middle to lift it up by, and a little Guttur to take the Water from the Basen, and another to discharge it by into the Level when the Trough is full. On the Top of the Hill above the Spaw, on the other side of the Highway is a very pleasant, clear cold Spring, which at a little Charges might be turned to a cold Bath, or a River Bath might be made in the *Derwent* Side, by the End of the Level. 3. Tho' the Iron-stone, (which we imagine this Water to be highly impregnated with) lie at such a Distance off, and the Spring has so long and perhaps a winding Course, yet since the Water rises so spiritous and fine, hence see how well the Earth preserves those Waters, how little they suffer before they are exposed to the Air, and how quickly they decay after. 4. Since this Spring has no Dependence on change of Weather nor Seasons, it must lie a great Distance from the Surface or Day, it must also suffer no Alteration by Rains or Floods, nor can we suppose it weakened by any adventitious Mixture of other Springs, seeing it so slow and affords so little Water. 5. Since both its Sediment and Earth are so red, and stiptic to the Taste, and the last so readily yields to the Attraction of the Load-stone, then 1. It seems chiefly to consist of Ocre, and very little calcarious Earth. 2. Ocre being the greatest Part of its Earth,

Earth, it seems to run through the Crannies of Stone, and not Sand, Clay or Gravel, of all which it contains so very little or none. 6. Since it is always covered with a thick strong reddish Scum, and Solution of Silver gives it a brownish Cloud or Tincture, and Solution of Sublimate a dark white, then we conclude it is not destitute of Sulphur. 7. Since it cruddles and precipitates with Oil of Tartar and Spirits of Hartshorn, and this precipitated Matter gathered, dissolved and filtred, then boiled to a *Lixivium*, set by to crystalize, it projects long hexagonal crystals, we say it contains a nitrous Salt. 8. This Waters precipitation with Spirit of Vitriol, Syrup of Cloves, Tincture of Fustic-wood, &c. are *Phænomena* peculiar to it self, and incompatible with any other Waters I have tried in these Bounds, as also the Waters turning green with Spirits of Hartshorn and Tincture of Galls. 9. Since this complex Sediment ferments neither with Spirits of Vitriol, nor Hartshorn, nor Salt, and very little with Oil of Vitriol we see it is neither much alkaline nor acid, but neutral, which is the only Earth of this Kind we have found, 10. Since this Water weighs so light, as it springs fresh up, but much heavier when it has stood some time in the Bason, or other Vessel, we say it contains much mineral Spirit. 11. Since it strikes instantly purple with Galls or other Astringents when fresh taken up, but very slowly afterwards, we conclude it contains volatile Vitriol. 12. But since Galls, green Tea, Sumac red Roses, oak Leaves, &c. strike the Water purple after it has stood so long exposed to the Air, or when boiled; or an Infusion of its Sediment, or a Solution of its Salt. And since we find vitriolic Crystals interspersed with the nitrous, we say it also contains fixt Vitriol. 13. This affords us certain Marks whereby we know when a Water contains only a volatile, or a fixt Vitriol or both. For 1. The first loses its tincturing Property with Galls, by being long exposed to the Air in an open Vessel, or on being warmed, but especially if boiled. The last strikes still purple, after all these, yea, an Infusion of its Sediment does it: But an Infusion of the first strikes not purple with Galls, this not being the Property either of Nitre, or any other mineral Salt besides Vitriol. 2. The Liquor above the Precipitation of the first from Galls, is clear, but that on the last is a deep red, crimson, mazarine or blue. 3. You shall never find vitriol crystals interspers'd with the Salts of the first; but if you exhale a Quantity large enough of the last you may procure them two or three different

ferent ways. 4. From this very Water observe we the following Mistakes in Doctor *Lifter*, and the rest of the late Writers who have all copied after him. 1. That no mineral Waters contain a fixt Vitriol, to maintain which Hypothesis, and conceal the Truth, it would make one smile to see what a Shift he is put to; first that there was another Salt besides Nitre, he could not avoid owning; but this must be a plumose Alum, because he had before said that Alum-stone dissolves not, nor emits any of its Salt to common Water; therefore common Alum or Vitriol it must not be by any Means, but plumose Alum it shall be. 2. Sulphur Waters, says he, are from the slow Course and Stagnation of those Waters, for were the Springs often kept upon the Pump they would not stink; but we see here a Water that's of a very weak slow Spring, long Course, a Stagnation of some Part for Months, yea whole Years, yet smells not. Therefore we must find some other Reasons for their Fœtidness than these. 3. That the Salt of the Spaw is the same calcarious Salt with that of *Scarborough*, whereas *Scarborough* contains Nitre and marine Salt only and no Vitriol, this Nitre and Vitriol, but neither rock nor plumose Alum nor marine Salt: Again *Scarborough* Earth is chiefly calcarious, this chiefly Ocre. 15. Since seven Pints of this Water exhaled left seven eights of half an Ounce of Sediment, that is, one sixteenth of an Ounce to a Pint, then the fixt Parts of this Water are to its Vehicle as 2 to 256. This seven eights of half an Ounce of Sediment affording one hundred and twelve Grains of Salt, then the Proportion the Earth bears to the Salt is as 51 to 49. But none of this Salt upon Crystalization affording either cubick Crystals, nor crackling on a hot Iron, nor instantly precipitating Solution of Silver, it contains no perceptible marine Salt. The Proportion of the Nitre in this Salt, is to the Vitriol as 9 to 1.

July 26, 1732, I exhaled two Gallons of *Malton* Spaw, had an Ounce of Sediment, which, dissolved in Water, filtered and exhaled, left near half an Ounce of Salt which I divided equally, put a half of it in a Tea-cup, when dissolved in Water, the other half being also dissolved. I put in another Cup which I had rubbed hard several Minutes with a Piece of Alum, without breaking off any of it. I set both to crystalize, the Crystals were exactly the same being pure Nitre only, neither marine Salt, Alum, nor fixt Vitriol in them; neither a filtered Infusion of this

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Sediment,

Sediment, Salt nor Earth, would give the least purple with Galls, &c. Hence 1. rubbing the Vessel with Alum is a meer Jest, makes no Difference in Crystalization. 2. This Spaw contains not fixt Vitriol at all Times.

Since we find this Spaw contains a mineral Spirit, fixt and volatile Vitriol, Nitre and Sulphur, whereupon depends its many and great medicinal Intentions, I shall briefly give the Differences between it and *Scarborough*, which are chiefly these; 1. The last has less volatile, and no fixt Vitriol at all; the first has both. 2. The last has marine Salt; the first less or none. 3. The last has very little Ocre, and much calcarious Earth; this little or no calcarious Earth, since it ferments not with Acids, but very much Ocre. 4. *Scarborough* has more Salt than Earth; this more Earth than Salt. 5. This is a much slower Spring, and a far longer Course than *Scarborough*, whose impregnating Materials lie just at the Spring Head. 6. This affords a much less Quantity of Water than that, the first throwing up but about thirteen Gallons in an Hour, and the last one hundred and twenty Gallons. Therefore as the primary Intentions of *Scarborough*, beyond most other Waters, are against the Scurvy, Rheumatism, Hectic, Thirst, recent and partial Inflammations, Diseases of the Skin, Worms, Disorders of the Stomach, Diseases that are the Effects of Luxury and Intemperance, reducing gross Bodies, removing habitual Costiveness, Heartburn, or wherever sweetning and cooling the Blood and Humours, or purging the Body is indicated. So *Malton* Water is chiefly beneficial in the Hypo, beginning Dropsy, Jaundice, Asthma, internal Ulcers, Hemorrhages or Weakness of the Vessels, many and great Obstructions in the Lungs, Liver, Spleen, Sweat bread, Mesentry, Uterus, or other Bowels of the Breast and Belly, a Relaxation, Weakness, Languidness, and Paleness of the Body; for it is certain that a strong chalybeate Water that's laxative at the same Time is both an alterative and purgative, and therefore much preferable to those that are only one of the two, because it answers the Use of both chalybeate and purging Waters at once. It is certain there is no medicinal Waters in *England* stronger of the Minerals than this, nor have I ever seen any, whether imported foreign Water, or any of those of our own Country near so strong; being loaded even too much: Hence, were *Scarborough* and it mixt and drunk together, they would

would certainly answer a greater Variety of Cases and Intentions, and be much more efficacious, than drank separately. It would also be highly conducive to produce the Effects of other alterative Waters imported and sold in the Shops, were this also mixt and drunk with them, as *German Spaw, Pyrmont, Holt, &c.* the last whereof contains only Nitre, and calcarious Earth, as I find upon strict Examination of it. And it is a Wonder that we, who are so fond of importing other Waters, should not export this, which will carry to the four remote Corners of the Earth without losing its chalybeate Property. If the Fixedness of its Principles be objected to it, I would gladly know if they are more fixt than Salt, Tincture, Syrup, and Infusion of Steel in Wine, or medicated Drinks made from Iron or its Crocus; these in many Cases overheat the Body, rarefy the Blood, and do Mischief; but here is a delicate fine Nitre to cool the Blood, prevent its Rarefaction, or other Harms that might happen. The Scum and Mud of this Spaw, wrought together and applied outwardly, cleanse, dry and heal up old Ulcers, Scabs, or Tettars to a Wonder.

As to Directions for the Use of this Water, such as have any Expectation to answer by it, or would indeed receive Benefit, should observe a very strict Regimen; they should drink it more sparingly than other Waters, as it is more loaded with the Minerals and may thereby pall the Stomach more; from three half Pints to three Pints may be a sufficient Dose here, except it's mixt with some fine common Spring Water, which it will bear with Advantage to lower it. Since it cleanses the first Passages both upwards and downwards the first two or three Days especially, it is its own best Preparative; nor should it ever be drunk with *Glauber* or *Epsom* Salt, or cream Tartar, or other Purgatives, for these expell it out of the Body, and find it another Outlet than Nature intended it chiefly for, nor should any flesh Meat be allow'd with its Course, except those of the easiest and highest Digestion, and even these eaten sparingly, as Rabbit, Veal, Chicken, Hens, Lamb, &c. but all kinds of Fish, Goose, Turkey, Duck, salt Flesh, Cheese, &c. are utterly inconsistent with the Design of the Water, the same are Ale, Spirits, Punch, Drams, &c. This Water requires more Exercise than any other

other of this Class, nor must the Exercise be violent. It should be drunk in a Morning only, in smaller Doses and longer Intervals than the last, in a Word there must be a strict Observation of seasonable Hours, Temperance, Exercise, suitable Meats and Drinks, &c, to reap the surprizingly great Benefits of this Spaw



of

Of Stenfield, Afwarby, Walcote, Orston, Ansby
and Semperingham Spaws.

112. **T**HE first of these lies ten Miles from *Grantham*, ten from *Stamford*, twenty three from *Lincoln*, five from *Faulkingham*, two from *Bourne*, and two from the Duke of *Lancaster's* Seat in *Lincolnshire*, in a most fruitful and pleasant Soil as is in *England*, upon a gentle Descent, within a quarter of a Mile of a large beautiful Grove of Wood, and two little Miles from the Marsh or Fenns, near two fine Parish-Churches, situate amidst the richest Corn Fields, Meadows and Pastures I ever saw, in a part of the Estate of Sir *John Heathcoate*, Baronet.

113. About forty Years ago, one *Robert Harwood*, wanting Water for the use of his House, sunk a Draw-Well before his Door, in a Puddle-Hole, where the Swine in very hot weather used to lie and wallow. As soon as he had built and finish'd his Well, in dedication of it to *Bacchus*, he made a good Brewing of strong Ale. The Liquor, when drank, prov'd a most strong, easy, safe and pleasant Purge. After this Discovery, the Country-people resorted to it in great Companies every *Sunday*-morning all the Summer-Season. About five Years alter, it became more noted, and of late has got on the Wings of Fame, by the Recommendation chiefly of that ingenious Physician Dr. *Ed. Greethead* of *Lincoln*, the great *Æsculapius* of the Country : For at that time there were no other Waters of that kind known in all those Parts. And about five Years ago, the Proprietor of the Place and Spaw, built a small House for the Reception of a few Strangers, and a Cover over the Spaw, with a Lock upon it, with a short Walk just by, boarded over, for three or four People to walk in when it rains. The Reservoir to this Water is to this Day the same that was made at first for the Draw-Well, being nine Foot deep, four square, two Foot and half wide on each side above; but lower down, it's a Circle, whose Diameter is three Foot and one Inch. The Water taken out of this full Reservoir is very heavy, nauseous-tasted, muddy, and full of Oker : But empty the Well, and take it up as it springs, it's very light, exceeding clear, a pleasant-tasted Vitriolic Water, full of Spirits. I caused the Well to be emptied, and went down to the bottom; where I found two Springs at near a Yard distance: One rises from under the Stone-Wall at the South-side, and may be heard coming at a great distance under ground, rising with a Sound exactly like two brace of Drums three hundred Yards off:

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It boils up perpetually, and throws up thirty Gallons of Water in an hour. The other Spring runs from under the Wall on the North side, in a continued Stream, and casts forth twelve Gallons of Water in an hour: They are both of the same kind; but the Last is the strongest, being deeper colour'd, and lets fall a larger Precipitation with Galls: They, like other purging Waters, cruddle Milk and Soap.

114. Solution of Silver turned the South Spring of a deep Pearl Blue, and let fall a small Lead-colour'd sediment. That on the North side was the same. With Tincture of Verdigrease, both were first of a greenish Brown; then let fall a yellow sediment: But that on the North side had the largest Precipitation. Tincture of Nephritic Wood changed the South Spring green, and let fall a small sediment. Both were yellow with Tincture of Rhubarb; But the last was deepest, which afterwards became a blackish Brown. Both were of a Pearl colour, and let fall an Orange-colour'd sediment with Solution of Sublimate. Solution of Sugar of Lead turned both white, and threw down much sediment. Both were whitish with Spirit of Vitriol; but they let fall much sediment, and became clear. The first Spring was all yellow; the Water of the last was greenish above, and yellow below. With Syrup of Violets, both were of a muddy Pearl; but the last turned to a greenish Yellow. They were much the same, with Syrup of Cloves. Both were white with Oil of Tartar, cruddled, and let fall much sediment: That of the last was double that of the first. Both were white with Spirit of Hartshorn. Tincture of Fustic turned them of a muddy Yellow; the last was deepest. Tincture of Logwood changed the first of a deep Blue, with much sediment; the last, of a greenish Blue, with more sediment. Tinctures of Galls and *Sumach* made the deepest and finest Purple with the first; but the last was of a very deep Peas-bloom, and had much sediment.

When a Pint of this Spaw had stood twelve Hours in an open Pot, and ten Drops of Tincture of Galls put to a Glass of it, it was first of a deep Raspberry, then purple Red, then a wholly opaque Peas-bloom, and so let fall much sediment. The very same it did when fresh taken up. Nay, when a Gill of it had stood in my Lodging Room in a Pint-Mug two Nights and a Day and a half, one Grain of Powder of Galls struck it first of a transparent pale Purple; then deeper; then it cruddled, and was perfectly an opaque Peas-bloom Colour. When it had thrown down its sediment, and become intirely clear and fine above, I poured off this clear upon fresh Galls; but it would no longer strike the least Purple. When this Water had stood exposed two Days and two Nights, it weighed no heavier than when just taken out of the full Basen. Some of it taken up scalding hot,
just

just at the boyling, tinged as deep as ever with the same Number of Drops of Tincture of Galls, in the same quantity of Water. The Water taken fresh up, began to crudle with Tincture of Galls in twenty Minutes, and let fall its whole Sediment in six Hours. That which had stood all Night open, crudled with Galls in six Minutes. That taken up scalding-hot, crudled instantly, and let fall its Sediment in twenty Minutes. Oil of Tartar and Spirit of Vitriol both chang'd the scalding Water to a deep Pearl and Opaque: It sparkled and fermented much with the last: Both let fall a large, brownish, white Sediment in five Hours. The Liquor above was clear; but the last had most Sediment; nor could it be wash'd off from the Glass-sides without Salt.

This Water taken up clear, turn'd whitish by standing, and cast up a strong, variegated Pellicle. When put on the Fire to boil, it first threw up a very thick Froth all over its surface, like a Barber's Lather, then a thin Oker-Sum. After three minutes boiling over a great Fire of Wood, it struck purple, with Galls, and instantly precipitated. Upon long boiling, it turn'd all of a deep brown, or Oker-Colour, and thick. A large Phial-Bottle filled a third part full of this Water fresh from the Spring, and set in the Pan of cold Water, when the last began to boil, the Phial threw out its Cork with great Violence, and a prodigious Crack. When sixteen Quarts of this Water was boil'd away to eight, neither that in the Pan, nor Phial struck any longer Purple with Galls; but was of a whitish Clay-colour; and when it had stood eight Hours, it was green throughout.

When I had tried this Water out of the full Bason, with the colouring Ingredients, and let them stand four Hours, with Tinctures of Verdigrease and nephritic Wood, it had precipitated much greenish Sediment. With Tincture of Rhubarb it was first yellow, then muddy, then blackish brown: Lastly, it crudled and precipitated. With Solution of Sublimate, it was first brownish white, then a whitish yellow, then yellow. With Solution of Sugar of Lead it's white and thick, then throws down a white Sediment, and leaves a clear Liquor. With Oil of Tartar and Spirit of Hartshorn, Tinctures of Gall and Sumach, as above. With Syrup of Cloves, of a dark Green. With Syrup of Violets, first muddy, then green. With Spirit of Vitriol, a strong Fermentation. With Tincture of *Brasil*, first reddish; but it quite faded and turn'd muddy, like Clay-water. With Tincture of Logwood it was of an opaque Mazarine blue; but it soon crudled and let fall much black Sediment.

Six Ale-Gallons of this Water exhaled, left three Ounces, two Drams and four Grains of Sediment, which fermented prodigiously with Spirits of Vitriol, Salt and Sulphur, or Oil of Vitriol. Several Waters poured on this Sediment, and let stand till they were clear, and that poured off and filtered, till there remain'd no more Salt in it to be dissolv'd; then the Earth dried, and the filtered *Lixivium* exhaled till the Water was gone, and Salt only left: The first weigh'd one Ounce seven Drams; the last was one Ounce three Drams; the four Grains were lost, tho' the filtering Cape was a very thick Paper, and carefully dried, and weighed both before and after. So that the Proportion of the Earth to the Salt is as fifteen to eleven; the Proportion of the Sediment to the Vehicle is as One to $236\frac{4}{5}$. Tho' this Spring at bottom throws forth Forty two Gallons of Water in an Hour; yet when the Well is full, I doubt whether it runs over six Gallons in 24 Hours, so leaking is the Wall. It's a shame that more care is not taken of so valuable a *Spaw*; especially when advertiz'd of the Mischief and Inconvenience of so great a Receptacle. Nature gives us a fine, clear, neat, light, spirituous, invigorating Medicine; but thro' Covetousness, Mankind must drink a heavy, thick, muddy, spiritless, stagnant stuff; and if they are not better, the Water must bear the blame; when it's great odds but the Cause lies in the Love of Pelf, that a little Money cannot be spared to make a Level for the bottom of this Well, and a small Basin laid down to contain about three Gallons of Water. This Salt dissolved again, and set to crystallize, was of a whitish yellow Colour, afforded very large Crystals of Nitre, and much marine Salt, which crystallizes not for a Month after the other: The first is to the last, as five or six to one. The above Experiments were made in *April*, tho' all Springs were at that time very low, being a great Drought. But *September* 3, following I tryed it again: It was a dark, brownish yellow, with Tincture of Rhubarb; very muddy with Solution of Sublimate; the same as before with Solution of Sugar of Lead; pale blue with Syrup of Cloves; bluish with Syrup of Violets; very deep Peas-bloom with Tincture of Galls; pale Peas-bloom with Tincture of Sumach. A Gallon of it exhaled now, left only seven Scruples and fifteen Grains of Sediment. Thus we see a considerable Alteration on Waters from the Seasons. A Bottle of the Water brought home with me, and let stand a Week, did not strike Purple with Galls. This Well is cover'd with a red scum; much Oker lies in its Bottom and Walls, wherein is Sulphur. The Earth of this *Spaw*, or Oker calcined, is briskly attracted by
the

the Loadstone; and uncalcin'd, huffs, swells and smoaks with the Acid Spirits, and turns of a beautiful light Yellow with Spirit of Vitriol.

115. From the whole of those Experiments, we see, this Water contains a very rich Mineral Spirit, at bottom, some Sulphur, much Volatile, but no fixt Vitriol, about one 4th Okrous Earth, and the rest Calcarious Nitre, and Marine Salt. The History of the *Band-Well* and Bath here, I gave in Part the First, among the petrefying Waters.

116. Eight Miles from *Stenfield*, three from *Faulkingham*, seven from *Grantham*, fifteen from *Lincoln*, sixteen from *Newark*, lies *Aswarby*; a quarter of a Mile on the South side of which, on the North side of an easy Ascent, on the left hand, on the Road-side from this to *Faulkingham*, rises up *Aswarby-Spaw*, which had some Ages past been of good Account; but having a very large Receiver, a poor Widow-woman's Cow going to drink of it, fell in, and was drown'd. This small Loss, joyned with the Ignorance of the Times, Peoples Inacquaintance with the Excellency and extensive Usefulness of such a noble Remedy, occasion'd its being fill'd up, whereby it was lost for some Ages; only a reputed Fabulous Report was handed down without any Knowledge or Remembrance of the Place, till the Year 1731, one Mr. *Hall*, the Schoolmaster of *Ansby*, discover'd it again. Then it was quickly frequented with vast Crowds of People from the Neighbourhood around, had great success in several Disorders; being a very gentle Laxative, it operated pleasantly, without griping Pains, Faintness, Confinement, or scalding Heat in the *Anus* (which all Waters impregnated with Marine Salt do.) It raised their Spirits, strengthened their Bodies, gave a most voracious Appetite, and strong Digestion. This invited the Lord of the Mannor, that truly honourable, vertuous, humane and ingenious Gentleman, Sir *Fr. Whichcote*, to try the Waters himself. He not only found, it answer'd all, but much exceeded the great Character he had heard of it. Then he set Labourers on to clear the Ditch in which it rises; in digging whereof they found the Wall of the old Recevoir (which was very large and wide) and prepar'd the Place for a new and proper Bason; at which time I happen'd to be present. This, and the Ground about it, is a stiff, strong Clay, under which is a Mountain of rich Iron-Stone, that in breaking glisters like wrought Iron, but so loaded with Sulphur, that wherever the Water makes any stop under Ground, the Earth turns shining black; the Water above Ground
leaves

leaves great Heaps of reddish brown Sludge, or Oker. On the other, or North side of the Town, under the Corn-mould, is Lime-stone, and plenty of fine petrefy'd Shells.

117. When I examin'd this Water in this poor low condition, *Apr. 27*, and 28, 1732, the Water, when in the Bason, or fresh taken up, is a very fine bluish Clear; but when it has stood some Hours, it turned muddy, and full of reddish Flakes of Oker. It has a strong Irony Taste and Smell, together with a grateful sweetness. It had then a double Cistern made for it, the first and largest whereof contains about 17 square Inches of Water, is fitted with a very strong close Cover, and lock'd up: The lesser is open, and contains only about 8 Inches every way, to prevent Peoples washing or bathing in it. It's supply'd by an Iron Pipe out of the surface of the larger Receiver. When I saw it, whilst they were repairing these Basons, it threw forth thirty nine Gallons and one tenth of Water in an Hour: Now I am inform'd, that it sends out only twelve Gallons in an Hour; but the rest may easily be recover'd upon occasion.

118. Solution of Silver turns this Water first white, then Pearl; lastly, of a slight Sky-blue. Solution of Verdigrease in Water makes it first whitish, then greenish, full of yellow Clouds and sediment. With Tincture of Nephritic Wood it's first whitish, then crudles, and lets fall a dark whitish sediment. With Tincture of Rhubarb it's first a very bright Yellow, then a dark yellowish brown. With Solution of *Sublimate* it's first whitish, then a dark white. With Solution of Sugar of Lead it's Milk-white, crudles, and lets fall a large white sediment. With Oil of Tartar it's first a pale white, then bluish white. The same it was with Spirit of Hartshorn, only the sediment was larger. The acid Spirits made even that which had stood some time, perfectly clear. With Syrup of Cloves it was a dark blue. With Syrup of Violets, first bluish, then very green. With Tincture of Logwood it was a beautiful Mazarine-blue. With Tincture of Galls it instantly gave a charming Peas-bloom Purple, then it crudled, and precipitated one Eighth of the Glass-full of sediment, the Liquor above being of a clear fine Purple. With Tincture of Sumach it was of a very deep transparent Peas bloom, and no sudden Precipitation.

I took three large Water-Glasses of near a Pint apiece, put ten Drops of Tincture of Galls into each of them; then filled up the first with *Aswarby Spaw-water*, the second with *Walcote-Spaw*, the third with *Sempeningham-Spaw*, let them all stand nineteen Hours.

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The first let fall four times the quantity of Sediment of either of the other two, of a deep Peas-bloom below, a dun Stone-colour above; the Water upon it was of a whitish Clear. The other two had near a like Sediment; that is, each of them about a quarter of the first, the Colour of *Balaustian* Flowers, very beautiful. More of those three Waters put into Phial-Glasses, then hard corked, and set in a Pan of Water till it boiled, then taken out, and poured on Powder of Galls; thus struck no Purple: But next Morning the first was of a deep Green throughout. This Water kept till it was a little fetid, Solution of Silver turned it instantly black, and threw up a Pellicle on the top, like a thick Cobweb. Solution of Sugar of Lead turned it also black. That Water which was taken up ten weeks, and was but indifferently corked, struck instantly Purple with Tincture of Galls, and a deep dark Yellow with Tincture of Rhubarb, and a deep muddy Blue with Tincture of Logwood. The Cover of the Cistern lifted up, the Water gave a little fetid smell; the Basons and Frame were covered with a very thick scum, below which was much Oker. Ten quarts of *Aswarby*-water exhaled, left near ten Drams of Sediment (just like reddish Iron-Rust,) that is, a Dram to a Quart: Thus the Sediment is to the Water, as One to 256. This Sediment, when dissolved in common water, gave a very uncommon and surprising *Phænomenon*, which I never met with before, *viz.* it turned the cold water and large Chocolate-Cup very warm; the Salt dissolved, filtered and separated from the Earth: The last weighed four Drams and a half of a fine purple Colour. This Earth calcin'd in a strong Furnace, much of it was attracted by the Loadstone; but its whitest part was not affected by it. Both this Earth and Sediment fermented violently with the Acid Spirits, but not its Salt: seeing this Spring, before its Bason was laid down, sent forth about thirty nine Gallons and a Pint of Water in an Hour; then it sent out nineteen Ounces and a half and half a Dram of Sediment in that time: But allowing this Spring to send forth the like quantity of Water the Year round (which I believe true, from my Observations upon it in *April* and *September*;) then it affords nine hundred and thirty nine Gallons of Water in twenty four Hours, which contains four hundred and sixty nine Ounces and a half of Sediment, whereof two hundred and sixty three Ounces is Salt, and two hundred and seventeen Ounces of Earth; so that the Salt is to the Earth, as Eleven to Nine.

119. That the Vitriol and Sulphur in those Waters are from the Iron-stone, as well as the Oker, is undeniable; since Rain, Mist, Dew, nay, the common Air it self, corrode, rust and dissolve Iron, when separated from its gross Glebe of Earth, and refin'd: Therefore wherever we meet with Vitriol, we may reasonably expect Sulphur in the same Liquor, Iron-stone containing one as well as the other, and being equally dissolved by the Water in the Corrosion of the Stone. Nor is there any other Metal dissolvable by Water, except Copper: The difference between which solutions in Water is, the first is exceedingly stomachic, exhilarating and strengthening; the last is nauseous to the Taste, irritates the Stomach, gripes the Intestines, inverts the peristaltic Motion of both, and causes terrible, painful and inflammatory Vomitings. The Vitriol of the first is green, that of the last is blue. Whatever Writers on this subject may advance, to puzzle and perplex both themselves and Readers; yet we are to look for none of the other Metals dissolved in, or by Water: For Gold is,

1. The most dense and simple of all natural Bodies, of a most compact substance, and freest from Salt, Sulphur or Mercury.
2. Of all others, it's the most fix'd both in the Air and Fire, since one Ounce of it will continue two Months uncorrupted, and without loss of one Grain in a Glass-Furnace.
3. It's only dissolvable by the Preparations of Marine Salt; but this Salt being never naturally of so great Subtility, Penetrability and Corrosiveness, to alter the *Compages* of Gold; and neither this Salt nor its Spirits existing in the Atmosphere, therefore this Metal never rusts. Silver also is incom-miscible with our Waters: For it's of so fixt a nature, even in the Fire, that it's little short of Gold, and contains so few of those things that are dissolvable in Water, and corrosive of its own substance. It's moreover, both hard and compact in its natural state, before it's refin'd. Nor are we to find Quicksilver in them: For besides, its being so ponderous, it's so very simple, and free from those Salts, which dissolving in Water, abode some part of those Metals wherein they are most prevalent; and lastly, its Insociability with Iron and Copper. Lead, from its Hardness and Compactness in a natural state, the Insolubility of its *Nexus*, and Indissolubility of its Parts in Water, the sweetness of its Salt, incapacity of solution from common Salt, do all make it safe for mixing with common Water, whilst in a natural state; tho' of most other Metals, soonest corroded by Acids when refin'd. Tho' Tin be the most spongy, fusible, light, soft, and incompact of all; yet it impregnates not our Waters: For 1. Tho' we have such
plenty

plenty of it in *Britain*, that several Learned Men think our Country derives its Name from it; yet we find no mineral Waters in those places where it's in greatest plenty, but what are impregnated with the same Principles only, as we find in Waters where there is no Tin.

2. Tho' this Metal does contain a Salt, yet it's of so sweet a Taste and inactive a Nature, as is not capable to corrode any part of its Metal. Hence we see, these Metals are not to be dissolved in their Mines; because their dissolving *Menstrua*, viz. the Acid of Nitre and Spirit of Sea-salt are not to be met with in the Mines. Therefore Gold, Silver, Mercury, Lead and Tin are neither to be found in their dissolved nor again concreted Juices. The semi-Metals are Vitriol, viz. of Iron and Copper chiefly: These are said to be the natural acid wandring Salt coyned to a metallic Glebe.

2. Native Cinnabar, which is made up of Sulphur and Mercury: But this being the Effect of Fusion in subterranean Fires, can only be where there are *Volcano's* (as is generally believed, tho' I have reason for the contrary;) but we having none of those, our Waters are free.

3. Antimony, a mere Compound of fossile Sulphur and Metal, therefore not commiscible with Water. Bismuth and Zint are like Antimony; the first consists of Lays and Scales, is white like Silver, harder than Antimony, but less friable, therefore less dissolvable. Zint is yet more compact and less dissolvable. The lower and more improper Class of semi-Metals are all fossile crystalline Bodies, stonous or earthy, all containing some sort of Metal in small proportion, as the *Armenian-stone*, *Eagle-stone*, *Blood-stone*, *Loadstone*, *Lapis Lazuli*, *Okers*, &c. These Chalybeate Waters, of all Salts contain the most Nitre, which of it self is neither Acid nor Alcaline, nor inflammable, is of a wonderful cooling, attenuating nature, restores and maintains the red Colour of the Blood, as is evident from Experiment; preserves both the solid and fluid parts of Animal Bodies from Putrefaction: Therefore in all inflammatory Diseases from a phlogistic Thickness of the Blood, it's, of all others, the most attenuating Salt, is wholly incapable of Mischief, either from its weight or Acrimony, excites not much Thirst, infallibly and pleasantly prevents the Alcalescence of humane Salts and Putrefaction of their Oil. But for all this, it continues not unchangeable in the Body, like marine Salt; but in time degenerates into the nature of Animal Salts. It's from the former Properties of Nitre, that purging Nitrous Waters, as *Scarburgh*, freed from their Vitriol, are so wonderful a Remedy in Hectics, being drunk in so small a quantity as not to purge. As to the wandring acid, fos-

file Salt, volatile and liquid, said to be met with in all Mines, which uniting with fossile Oil, *Petrelæum*, or the like, constitutes sundry native, fossile, pethioid *Sulphurs*, called *Vive*; and also unites with semi-Metals, as Cinabar, Antimony and other Fossils, as well fluid as solid. I shall not pretend to describe its Properties, Vertues and Crystals, till I can once find it brought under my outward senses, and so made liable to Examination: And this being *Simpson's Esurine Salt*, existing every where, and even, by his own words, partaking as yet of no quality, and so incognoscible, I shall take it for *gratis dictum*; tho' *Berhaave* and the Chymists will have it, with Metals to compose sundry *Calcantha* with calcarious Earths, several Alums, and with *Pyritis* the Mother of Vitriol; and burnt by a vegetative Fire, it produces common Sulphur, and is very like that which burning Sulphur produces, a smoke with a blue suffocating flame, fatal to all Animals. By which he describes us a kind of Sulphur instead of a Salt; and tells us, that the *Analysis* and Resolution of it and Sulphur are the same.

120. *Orston-Spaw*. I cannot find when, or by whom the Discovery of this Water was first made: But its singular good Effects in various Cases, as the Hyppo, Scurvy, Inappetency, Indigestion, Pain of the stomach, Costiveness, stoppage of Urine from Sand, Gravel, or Sludge in the Urinary Passages, Foulness of the Body, beginning Obstructions of the Liver, Spleen, and other *Viscera*, Ulcers of the Lungs or *Hemoptre*, has justly intitled it to the first Character of the Mineral Waters in *Nottinghamshire*; and the due and necessary Care taken about the Spring, will compleat its Usefulness to Mankind. It's about ten Miles from *Nottingham*, three or four from *Newark*, and four from *Beauvoir* Castle. It rises up perpendicularly into a Bason, out of a stiff Clayie soil, upon a gentle Descent. It had too large a Receptacle when I saw it, whereby the Water weighed ten Grains in a Pint heavier at its surface than bottom; the first also struck a pale Purple with Tincture of Galls, and precipitated its Oker in an Hours time; with Tincture of Logwood it was only muddy; but at bottom, the same number of Drops of Tincture of Galls struck an opaque beautiful Violet; and with Tincture of Logwood, a pale Blue. The Taste of the Water on the surface was disagreeable, rough and harsh, inclining to that of ; but at bottom, it was of a delicious, gentle, rough, sweetish Chalybeate-taste. This Recevoir is now taken down, a Level made, and a small Bason laid down, whereby the Water in the Bason preserves its volatile Parts whilst full. The

The bottom of the *Spaw* was heaped with shining black Sludge, some of which dried, and laid on a red-hot Iron, in a very dark place, sparkled, stunk, and threw out a bluish Flame. The top of the Water was cover'd with a thick scum; it crudled *Soap*. There was a very little Oker in the stream, but much stinking black Sludge, which smelt strong of Sulphur. The under-sides of the Stones lying in the Well, were Ink-black, and stunk much. With Solution of Silver this Water was a whitish Clear; next Morning it was clear, with a small white Precipitation; with Tincture of Verdigrase, whitish brown, and crudled; with Tincture of Nephritic Wood, first a whitish Clear, then clear, with a yellowish brown Precipitation; with Tincture of Rhubarb, first blackish Yellow, then very dark muddy Brown; with Solution of Sublimate, first muddy white, then let fall a small Precipitation; with Solution of Sugar of Lead, first a dark Pearl, then clear, with a small white Precipitation; with Oil of Tartar, first whitish, then crudled, and let fall much sediment, and clear above; With Spirit of Vitriol, a whitish Clear; with Spirit of Hartshorn, first whitish, then a large Precipitation of a yellowish brown Colour, and Liquor above clear; with Spirits of Salt, very clear; with Syrup of Cloves, first muddy, then a dark Green, then a very fine Green; with Syrup of Violets, first greenish, then a pale muddy Green; with Tincture of Logwood, first a light Blue, then clear, with a blackish green sediment; with Tincture of Galls, a Violet-Purple precipitated the Glass half full: The next Day the Liquor was clear at top, with a very large deep blue sediment; with Tincture of *Sumach*, a light Purple with a small sediment. I took up a Bottle of this Water when the Receptacle was full; another when it was emptied, took both to *R. Thoroton's* at *Streaton*, Esq; let both stand all Night; the first weighed twenty four Grains heavier than at the Spring, the last thirty Grains in a Pint: Nor wou'd the first strike the least Purple with Galls; but the last struck as deep a Purple, as when immediately sprung up. Two Water-Glasses filled with this Water, one out of each Bottle, poured out, and let stand open all Night, next Morning the last taken up, had no sediment, but was of a pale whitish Colour; and with Tincture of Galls struck as deep a Purple as ever. The first had let fall much Oker, quite lost its Chalybeate Taste, and struck not the least visible Purple with Galls. This Bason was not only too large, but was full exposed to the Meridian and western Sun. See here again, what Mischief a Large Bason does the Water: But this

is removed, and all possible care taken to preserve the Efficacy of this Water in all its parts, by that most ingenious worthy Gentleman *Robert Thoroton*, Esq; who accompanied me himself, and was witness to my whole Process of Experiments, was readily convinced upon evident Demonstration, and set himself immediately to remedy this Inconvenience, and make it more useful, tho' not in his Estate, but in the Duke of *Kingston's*, purely from that noble Principle of Philanthropy, whereof he has so large a share. Forty eight Pints of this Water exhaled, left of a reddish brown sediment one Ounce and seven tenths, or thirty two Penny-weight; that is, 16 Grains to a Pint; so that the Sediment is to the Vehicle, near as 1 to 512. Nine Penny-weight of this Sediment afforded two Penny-weight and one fourth of Salt, which was wholly Nitre; so that the Earth of this Water is to its Salt, as 27 to 9, or $13\frac{1}{3}$ to $4\frac{1}{3}$. This Water is replete with a Mineral Spirit to a Prodigy: When fresh poured out into a Glass, it sparkles and flies and makes the Drinker's Head very giddy. The Water purges People of a gross bulky Habit, gently moves the Body of others, makes the Tongue, Throat and Feces of the Drinkers perfectly black. Its other Principles are, Sulphur, Oker and Niter, with some calcarious Earth.

121. Nor can I here wholly omit the common Waters about *Streveton* or *Streaton*, *Carcolston* and *Flinham*: All their Grounds abound with Sulphur; and the Sludge under the stagnant Waters is black, stinks, and gives full Proof of Plenty of Sulphur. Many of their small Springs emit a sensible sulphureous smell. On the North side of *Cartolstone*, near adjoining to *Streaton*, is a small Spring with a little sulphurous smell, which precipitates Solution of Silver instantly. This last discharging it self into a number of small Springs, and these into a little Brook, called *Cardyke*, the Water whereof is used in Brewing, makes the Table-Beer a pleasant gentle Cathartic, and lines the Stream of the Brook with black sulphurous Sludge. This Beer tastes Winey, sparkles, and is like rich *Champaigne*.

122. Two Miles from *Faulkingham*, and two from *Aswarby*, is the antient Monastery, or Priory of *Semperingham*, or the Order of *St. Gilbert*, built in the 12th Century, by *Gilbert de Gaunt*. From under the South-west Corner of its Foundation, rises up into a small Bason, a fine light Chalybeate Water, called *Semperingham-Spaw*; which, tho' clear and pleasant, yet is so much weaker of both purging Salt, and volatile Vitriol, that it's much short of *Stenfeld* and *Aswarby*, whereby it is now fallen into Disesteem, tho' the antientest Mine-

Mineral Water in this County, and was of great repute and service to the *Benedictine* Nuns and *St. Augustine* Friars, whose Vertue and Health were often owing to it. Four quarts of this Water exhaled, left thirty two Grains of sediment, nine whereof was Salt, the rest Earth, of a light brown Colour, which fermented violently with the acid Spirits. The Salt was Nitre; then the Sediment of this Water is to its Vehicle, as 1 to 1920.

123. *Walcote-Spaw* rises out of the North-East Corner of a Close on the Left hand from this to *Faulkingham*. It's a very clear, pleasant Water; but has too small a quantity of Salt to move the Belly much, tho' a very little laxative; but exceedingly light and diuretic. It has formerly been of very considerable Note; but what from the Nearness of *Aswarby*, and the ill Temper of the present Possessor, who has caused it to be stopt up, and made up the Road to it, it's out of use. Five quarts of it exhaled, left a greyish white sediment, mixt with small white specks like coarse Flower, near eight Scruples, four Scruples and a half whereof was Salt, three Scruples and a half was Earth, of a dark whitish Colour, which fermented much with the acid Spirits. Then the Sediment is to the Water, as 1 to 380.

124. *Ansby-Spaw*, five quarts of it exhaled, left of greyish brown sediment nine scruples and a half, five scruples whereof was Nitre, and four scruples and a half was Earth, which made a strong Ebullition with the acid Spirits. All these Earths were a Mixture of Oker and Stone-powder; so the Sediment here is to the Water, as 1 to 202½.

125. *Aswarby*, *Ansby*, *Walcote* and *Semperingham* Waters compared together April 28th, in a very dry season, were as follows. The first with Solution of Silver, was first Pearl, then precipitated a large sediment; the Liquor above was clear. The second was of a pale White, then of a small light Purple, had a Leaden coloured sediment. The third was whitish, turned a little purplish, deposited a pretty large sediment, partly white, partly purplish. The last was a faint Pearl, a very small white sediment. With Tincture of Verdigrase, the first was of a Leaden Colour, then clear, with a large Orange-colour'd sediment. The second very little altered; the third and fourth yet less, with scarce any sediment. With Tincture of Nephritic Wood, the first was first whitish, then green, with an Orange-colour'd sediment, Lastly, green throughout. The second was first of a pale White, then green. The third and fourth were greenish,

greenish, had little Sediment : Had they stood some Hours longer, they had been wholly green. With Tincture of Rhubarb, *Aswarby* was of a light Yellow, then of a dark yellowish Brown. The second was a lighter Yellow, then a deep reddish Brown : The third of a deeper reddish Brown : The fourth yellow, then a dark Brown. With Solution of Sublimate, the first was yellowish, with little or no Sediment ; the second a pale Pearl ; the third and fourth whitish Clear. With Solution of Sugar of Lead, the first was wholly of a dark White, and was the first that let fall a light brown Sediment ; the second, Pearl without Sediment ; the third and fourth of a Leaden Colour. With Oil of Tartar the first was whitish, crudled, let fall much Sediment ; the Liquor above was perfectly clear : The second was full of Clouds, but let fall no Sediment, after it had stood four Hours : The third and fourth were near the same with the second. With Spirit of Hartshorn, the first was white, crudled, and let fall a Sediment one third the Contents of the Glass ; the second was white and cloudy ; the third and fourth were only whitish, and had scarce any sediment. The acid Spirits altered none of those Waters. Syrup of Cloves alter'd the first to a blackish Blue : Syrup of Violets turned the first bluish, then of a Clay-colour, which in time would have been green ; the second was of a bluish Green, the third and fourth of a clear Green. Tincture of *Brasil* gave all four a faint reddish Cast ; as Tincture of Fustic gave them a yellowish. With Tincture of Logwood, the first was of a Mazarine-Blue, crudled, let fall much deep blue sediment Liquor above a Violet-Blue : The second was a fainter Blue ; the third and fourth had neither so much sediment, nor of so deep a Blue. With Tincture of Galls, the first was of a transparent Peas-bloom, then crudled, and let fall a large Sediment : The second was much lighter ; the third very red, had little Precipitation, and that in small Clouds, like Fibres of Blood ; the fourth was purple, crudled, and let fall a little sediment.

126. Eight Miles from *Stamford*, four from *Bourne*, and two from *Stenfield*, is *Cawthorp*-Village ; in the middle of its Street rises up into a large Basen a Mineral Water, which foams much as it rises up, and crudles Soap and Milk : It's considerably heavier than common Water. Tincture of Verdigrease turned it yellowish ; Solution of Silver, whitish ; Tincture of Rhubarb, first yellow, then a deep brownish Yellow. Solution of Sublimate, of a Leaden Colour ; Solution of Lead, white ; Oil of Tartar changed it very white, after which, a yellow Sediment, and a clear Liquor. It was clear with the acid

acid Spirits, only there was a visible Ebullition on their Mixture. It was green with Spirit of Hartshorn, bluish green with Syrup of Violets, yellow with Tincture of Fustic; with Tincture of *Brasil*-Wood, a Red, which presently faded; a deep opaque Blue with Tincture of Logwood; an opaque Purple with Tinctures of Galls and Sumach. When a Gill of this Water had stood twelve Hours in a Pint-Mug, with Galls it struck a very deep opaque Peas-bloom, became perfectly black, let fall much sediment, and was perfectly clear next Morning. The Water above the Sediment, with the Tincture of Sumach, was a fine reddish Purple. That Water, with Tincture of Logwood had much deep blue Sediment, and a clear Liquor upon it. These Glasses of it, with Tincture of Nephritic Wood, Oil of Tartar, and Spirit of Hartshorn, had each of them much sediment. Six Pints of this Water exhaled, left six Scruples of very white sediment, fifty four Grains whereof was Salt, and sixty six Grains Earth, which fermented, hissed, and smoak'd with Spirit of Vitriol, and yet the Loadstone acted briskly on it after Calcination. The filtered Liquor boiled to a *Lixivium*, and set to crystalize, projected only Marine Salt, with some little Nitre. The Sediment of this *Spaw* is to the Water, as 1 to 334.

127. *Thursk-Spaw* in the North Riding of *Yorkshire* lies about a quarter of a Mile from the Town, on the side of the Road to *Northallerton*, in the Ground of one Mr. *Bell* of *Sowerby*, but anciently the Lordship of the Family of the *Lascelles*. It rises up at the bottom of a Hill full East, boils up continually like a Pot, throws out above an hundred Gallons of Water in an Hour, colours its Basen and Stream red, throws out Filaments or Films like Pieces of Gold-beaters Bladder. It is uncertain how long it has been known: The Report is, that it was accidentally discovered by some thirsty Travellers drinking of it, whom it purged. It throws out the same quantity of Water at all times: It is of a crystalline Colour, Inky smell and taste, sparkles like *Champaigne*, when poured fresh into a Glass. It will keep some Months without turning fetid. The Soil out of which it springs, consists of first Gravel three or four Yards deep, then a red Clay four Yards deep, then Shale mixed with Iron stone and Marcasites of Iron, under which very likely Coal. If drunk, from three Pints to six it purges both by Urine and Stool. It's used both for Drinking and Bathing; and there are abundance of Instances, wherein it has cured Lameness, fix'd and wandring Pains, Eruptions on the Skin, Leprosie, &c. Tincture of Nephritic Wood
turned

turned this Water, first of a Cream-colour, then green. Solution of Sublimate alter'd it not. Solution of Sugar of Lead made it of a thick muddy White, with much sediment : Oil of Tartar, of a light Pearl-colour, and afterwards let fall a sediment. - The same it did with Spirits of Hartshorn. Spirits of Vitriol and Salt turned it of a blackish Clear, full of Bubbles. Syrup of Violets, of a Grass-green. With Tincture of red Saunders, a light Green; with Tincture of Fustic, a pale Yellow ; with Tincture of *Brasil*, a very light Red; with Tincture of Logwood, a deep Blue, and let fall a large sediment ; with Tincture of Galls, a Purple, and let fall much sediment ; with green Tea, a blackish Purple ; with red Roses, a pale Purple ; with Tincture of Sumach, a pale red Purple ; with Brandy, blackish. Two Gallons of this Water exhaled, left nine Scruples of sediment, four and a half whereof was Salt, the rest Earth, of a whitish brown Colour, and fermented strongly with Spirits of Vitriol and Salt. This Salt dissolved, and set by to crystalize, afforded the beautifullest small Crystals of Nitre of any of them, about Four Parts, and a Fifth Part Marine Salt. Then the Sediment of this *Spaw* is to its Water, as One to 682 $\frac{1}{2}$. The Salt and Earth are near equal.

128. At *Tibshelf* in *Derbyshire*, or *Tibshall*, as it is commonly pronounc'd, is a reputed purgative Mineral Water : But how the Authors of the *Magna Britannia* have remov'd it to *Stanley*, is hard to tell : For I could only meet with a large Horse-pond of common Water ; nor did the Inhabitants ever hear of a *Spaw* there, before the kind Gentlemen made them a Present of an invisible one, and that of no less note than that at *Quarndun*, and this as considerable as the *Yorkshire Spaws*. But such Blunders are unavoidable, when Men sit at Ease in their warm Study, and take things upon trust, and that very often from such as are no Judges. But to our *Tibshelf-Spaw* : It rises up directly North, about the middle of a pretty long easy Descent, into a very good small Stone-Receiver, under a Hedge close by the Road-side, which goes to *Stenfield*. Half a Mile East of this is got very rich Iron-stone, and a quarter of a Mile South from it, is Plenty of good Coal. It leaves abundance of Oker, both in its Bason and Stream. There are two things remarkable in this *Spaw* ; first, tho' the Winter be never so Rainy, yet it is so dry till the Spring, that it can never fill its small Bason, far less run over. But during the Summer, let the Weather be never so drougthy, it discharges it self in a rapid stream of two Inches Diameter ; and before Rain and high Winds it rises impetuously in Bubbles,

Bubbles, turns whitish, white, or very white; which Bubbling, or change of Colour is always in proportion to the quantity of Rain that's coming, or the height and storminess of the Wind that is to blow: After these are over, it returns to its natural Colour, which is very clear. Its smell is inky, and taste ferruginous. With Solution of Silver this Water was white and thick; with Solution of Copper, a deep sky Blue; with Solution of Sugar of Lead, a pale White, and thickish; with Oil of Tartar, white: The acid Spirits alter'd it not; with Syrup of Violets, a blackish Blue at first; with Tincture of *Brazil*-wood, a pale Red; with Tincture of Logwood, first reddish, then a deep Blue; with Tincture of Galls, first red, then purple, then Crimson, without any Precipitation: But when a Precipitation was thrown in, there fell a sediment half an Inch high, the Clear above being still purple; with Tincture of *Sumach* it was a finer and stronger Purple than the last; with Brandy it was a blackish Purple. These Experiments were made *October 2*, which was a very cold Day. A Pint of this Water taken up, kept seven Hours, and carried twenty Miles, had lost its Transparency and fine sparkling upon pouring out into a Glass, and was whitish. The preceding Mixtures repeated with it, and let stand thirteen Hours, were as follows: With Solution of Silver the Water was clear, a small Precipitation at the bottom of the Glass, and an Incrustation on the sides; with Solution of Sublimate it had a bluish Pellicle on the surface, under that a clear Liquor below, which was a yellowish Precipitation; with Solution of Sugar of Lead, much white sediment; with Oil of Tartar, many white Clouds, and a very small woolly sediment. Spirits of Vitriol and Salt made no Change; with Spirit of Hartshorn, the Water was Cloudy, and let fall a small yellow sediment; with Syrup of Violets, a clear light Green; with Tincture of Fustic, a deep Yellow; with Tincture of *Brazil*, a deep opaque Red; with Tincture of Logwood, a deep opaque Blue; with Tincture of Galls, a fine Purple, without sediment, but full of Clouds and Air-Bubbles; with Tincture of green Tea, a fainter Purple: with Tincture of *Sumach*, the darkest Purple of all, but afterwards turned of a thick dirty Purple. Four spoonfuls of this Water left in the bottom of an open Bottle fifteen Hours longer, struck a brisk Purple with Galls; the same it did after six Hours more; but two remaining spoonfuls had wholly lost this Property in thirty six Hours. When these Mixtures had stood thirty seven Hours longer, their further Alterations were, The Precipitation and Incrustation with Solution of Silver were of a purple Colour, but the Wa-

ter clear. That with Solution of Sublimate had a thick Pellicle and a large yellow sediment. The Clouds in these, with Oil of Tartar and Spirit of Hartshorn were fallen down, and the sediments were larger. That with Syrup of Violets was clear, and perfectly green. These with Tinctures of Logwood, Galls and green Tea, had retain'd their Colour, but no Precipitation. These with Tinctures of *Sumach* and *French Brandy* had precipitated a deep blackish red sediment, but in a very small quantity. Three half Pints of this Water boiled away to One, then three half Pints more added to it, and made very hot, struck a weak Purple with Galls. These three Pints left a Scruple of sediment, twelve Grains whereof was Salt; which set by to crystalize, three parts of it was Marine, and the fourth Nitre, exceeding white and fine: The Earth was a fine Orange-colour; it fermented strongly, and turned a deep greenish Yellow with Spirit of Salt. Thus, the Sediment of this Water is to its Vehicle, as One to 1152.

129. To these, we shall add *East Retford Spaw* in *Nottinghamshire*, tho' no ways entitled to this Class, but in Complement to common Fame, which will have it to be a purgative Water as well as vomiting. It was discovered about five Years ago, rises up into a very neat new Stone-Bason, covered with a pretty Pyramid of Free-stone. It springs up directly North, in the North-East Corner of the Town, common, out of a Soil between Clay and Sand. It's a slow Spring, its Water of a muddy whitish Colour, leaves Oker in its Bason. It's cover'd with a whitish Scum. It's of a very Irony-taste, and Inky smell: It makes a good Lather with Soap, and boils with Milk: It is not nauseous do drink. The Water, with Solution of Silver is first whitish, then clear, and precipitated a small cloudy white sediment. With Tincture of Nephritic Wood, it was of a light Green; with Solution of Sublimate, it had a small rawny Orange-colour'd sediment, whitish Liquor, and a thick Film upon it; with Oil of Tartar, first of a pale White, then clear, with a small yellowish sediment; with Syrup of Violets, green; with Tincture of Fustic, a deep brownish Yellow; with Tincture of Logwood, blue at first, then a dark Black; but being diluted, it was blue again, and let fall some sediment: With Tincture of Galls, a deep scarlet Red, which neither faded nor precipitated; with green Tea, a pale muddy Purple; with Tincture of *Sumach*, first a reddish Purple, then an opaque, dark reddish Brown; with Tincture of Rhubarb, it was a dark blackish Yellow; with Solution of Sugar of Lead, white, crudled,

led, and let fall a sediment. The Water poured on Solution of Alum and Tincture of Galls mix'd, no Precipitation follow'd; but a Glass of Water poured on ten Drops of Tincture of Galls, and then Alum put in the Water, precipitated a small fine purple sediment. This Water struck Purple with Galls in the second, third and fourth Degrees of Heat, yea, gave a faint Tincture, after boiling a few Minutes. Five quarts of this Water exhaled, left eighteen Grains of a reddish brown sediment, which afforded ten Grains of a light brown Salt, and eight Grains of Earth, which calcined, was much of it attracted by the Loadstone. It fermented not with *Alcalies*, and very little with Spirits of Vitriol. Six Grains of the Salt dissolved in three Ounces of Water, precipitated Solution of Silver, turned Syrup of Violets green, Tincture of Logwood a deep Blue, Tincture of Galls full of Clouds, and reddish. The Sediment of this Water is to its Vehicle, as One to 4224.

130. We may join to these, *Buxton-Chalybeate*, not as it is a Purgative of it self; but mixt with *St. Anne's Water*, or *Bingham Well*, they prove a gentle Purgative, as I have experienced both in my self, and observed in others. It rises out of a Bank of Shale, on the North side of the Brook, opposite to the Hull. It is pretty clear as it rises, but lets fall much Oker in its Bason and Stream, weighs pretty near the same with common Water, lays the Spirits in the Thermometer one Eighth of an Inch lower than the River. It has a nauseous, rough, and Irony taste. Solution Gold alters it not; with Solution of Silver it's whitish, a clear Blue with Solution of Copper. It is white, both with Solution and Sugar of Lead, and lets fall a large white sediment: With Solution of Mercury it is yellow, and has a large Cloud at bottom; with Solution of Sublimate it is first a Pearl-colour, then white: Oil of Tartar, and Spirit of Hartshorn alter it little; Brandy turns it of a Leaden Colour; the acid Spirits make it a bluish Clear; Syrup of Cloves first makes it very red, then of a dark Blue; with Syrup of Violets it's a whitish Blue; with Tincture of Logwood it's blue; with Tinctures of Galls, green Tea, red Roses and *Sumach*, it's a fine Purple; with Tincture of Rhubarb, greenish Yellow; with Tincture of *Brasil-Wood*, a light Purple. This Water put fresh into an empty Receiver, and the Air exhausted, it quickly lost much of its taste, increased in Weight, and its Colour declined, and became muddy. Two Gallons and a half of this Water exhaled, left only two scruples and a half of sediment very black, twenty eight Grains whereof was Earth,

which calcin'd, answer'd the Loadstone ; twenty two Grains of Salt. The Sediment of this Water is to its Vehicle, as 1 to 3072. Six Grains of this Salt dissolved in half a Pint of distilled Water warm'd, with Solution of Silver, it was first Pearl; then purplish, and let fall a small sediment ; with Solution of Sublimate, clear, and a sediment like a little Wooll ; with Oil of Tartar, clear, and a little sediment ; with Syrup of Cloves, of a dark muddy colour ; with Tincture of Logwood, a fine Blue ; with Tincture of Galls, muddy. The rest of this Salt set to crystalize, it projected several Crystals of Marine Salt, mixt with a darkish Powder, which was Nitre ; so that this Spring contains volatile Vitriol, Sulphur, Oker, Marine Salt and Nitre : The first whereof is chiefly what is medicinal in this Water, and, as such, has the Virtues of the *Simple Chalybeates*.

131. Whilst I was writing the above, the Country was alarm'd with the Discovery of an incomparable new *Spaw* at *Burlington* ; but it being Winter before the Report reach'd me, the Season was elaps'd, and the Place at too great a distance to go to examine it. However, the following Hints may give some satisfaction : The first is a Letter from Dr. — of *Leeds*. “ Sir, having been in the East
 “ Riding of this County last Week, I met with a new Mineral Wa-
 “ ter ; so thought it not amiss to acquaint you with it, as it seems
 “ to be of a different nature from any hitherto discover'd or com-
 “ monly used (if the Account given me of it be just ; for I had
 “ neither time nor Conveniences to make any Tryals of it.) It's
 “ a small Spring, rising out of the Cliff or Bank of the Sea, near
 “ *Bridlington*-Key, about a Yard and half above the Sea-Sand, or
 “ High-Water, when the Tide is in, and might be made very con-
 “ venient, shou'd it prove worth while. The Spring flows out of a
 “ thin Bed of Flint-Pebbles, which it tinges of a red Colour, as o-
 “ ther Chalybeate Waters do. Mixt with Brandy (for I had no-
 “ thing else at hand to try it with) it turns a dark blackish Colour.
 “ It tastes almost like other Chalybeate Waters, but something more
 “ harsh ; which, from the Effect a Person told me it had, I suspect
 “ to be from Copper. He said, several People had drunk of it this
 “ Summer ; and after drinking a Pint, or somewhat more, then
 “ walking, it affects the Head a little ; and upon drinking a Pint
 “ more, it vomits the Person several times, after which it purges
 “ briskly both by Stool and Urine. I a little suspected the Vera-
 “ city of my Informer ; because he said so very much in its Favour,
 “ and declaim'd in his way, against *Scarburgh*-Waters. Whereupon

" I asked another Man of that Place, there present, who gave me
" much the same Account of it. The Water has no unplea-
" sant Taste, and is very clear. The last Man told me, it turned a
" little white, upon standing some time, &c."

As soon as I had received this Letter, I desired a Gentleman of my Acquaintance to write to a Relation of his there, Mr. *William Cartel*, an eminent Apothecary, to exhale three Gallons of the Water to a Quart, and put it up in a Bottle, and send it me, together with two Quart-Bottles of it taken fresh up, close cork'd and seal'd, which I received safe in a few Days. That Quart, which was the Remainder of the three Gallons, I boil'd away, and it left four scruples and fourteen Grains of a very white sediment, sweet like Loaf-Sugar. I took one Quart-Bottle of the Water for the following Mixtures. With Solutions of Silver, Sublimate, and Oil of Tartar it was very white; with Spirit of Hartshorn,, a darkish White; with Tincture of Rhubarb, a light Yellow; with Syrup of Cloves, blackish; with Syrup of Violets, a light Green; with Tincture of Logwood, a beautiful deep Red; with Tinctures of Galls and *Sumach*, very clear. But after it had stood six Days,, that with Solution of Silver had a purple Incrustation on the sides, and a black sediment at the bottom of the Glass; that with Tincture of Nephritic Wood was a yellowish Green; that with Tincture of Rhubarb, was a deep brownish Yellow; that with Solution of Sugar of Lead had a large white sediment; that with Oil of Tartar, a small white sediment; that with Spirit of Salt was reddish; that with Tincture of Logwood, was a reddish Brown; that with Galls, a deep, thick, opaque Green. The other Quart of Water I exhale, and had nine Grains of sediment, whitish, and of a pungent saline Taste. From this I extracted the Salt, and dissolved it in distill'd Water half a Pint. This, with Solution of Silver, was first a Pearl-colour, then a fine light Purple; with Solution of Sublimate, it was clear; with Oil of Tartar, and Spirits of Hartshorn, it was whitish, and precipitated a little; with Syrup of Cloves, a blackish Blue; with Syrup of Violets, very green; with Tincture of Logwood, a clear dark Brown; with Tincture of Galls, clear. The sediment of the three Gallons being dissolved in Water, and stirred, afforded sixty Grains of white Calcareous Earth, which fermented with the acid Spirits, and thirty four Grains of Salt.

132. From which Experiments we see, that since it tinges its Ba-
 son red, tastes Chalybeate, and turns Brandy blackish, it contains
 Vitriol: But since it neither tasted Chalybeate at my House, nor
 struck Purple with Galls, &c. it's only a light volatile Vit-
 riol, which is soon lost. Since its Earth is perfectly white,
 and a strong Alcaline, it's only Calcarious; since its Salt turns
 purple with Solution of Silver, is white, and precipitates with Oil
 of Tartar and Spirit of Hartshorn, it's chiefly Nitrous. But since
 the Proportion of this Sediment is to the Vehicle, as 1 to 2048, then
 it's impossible this Water should produce those Effects from its sedi-
 ment, supposing it were all Salt. But a Quart of the Water (the sup-
 posed Dose) affording only three Grains of Salt, allow this to be as
 strong as Tartar Emetic a Grain and a half, and as much *Elaterium*
 mixt, it's too weak for such a violent Operation. Therefore the Re-
 porters being prejudic'd in favour of their Water, must have mistaken
 the Dose, or magnify'd its Effects.

133. Upon the whole, we may make the following brief Reflecti-
 ons: 1. Since two Quarts of *Scarburgh-Water* taken up in *November*,
 and exhaled only seven scruples and a half of sediment; but two
 Quarts of it taken up, and exhaled, *July 25*, left eight scruples and
 thirteen grains of sediment: And since a Gallon of *Stenfield-Spaw* ta-
 ken up, and exhaled, *Apr. 25*, left fourteen scruples and eleven grains
 of sediment; but a Gallon of the same taken up, and exhaled *Sept.*
7, tho' in a very great Drought, left scarce eight scruples of sedi-
 ment. Again, since six Gallons of *Aswarby-Spaw* taken up, and ex-
 haled *Apr. 28*, left three Ounces of Sediment, wanting Forty six
 grains; but the same quantity of it taken up, and exhaled, *Sept. 11*,
 left three Ounces and thirty four grains, &c. then it's evident, that
 the same Mineral Waters contain not the same quantity of fixt Parts,
 or Contents at all times; but there is a great difference in their Pro-
 portions at different times. 2. It also appears plainly, that some
 Waters fall much shorter of the Proportion of their Contents, than o-
 thers: For *Stenfield* is deficient near an half, *Scarburgh* scarce one
 seventh, *Aswarby* one eighteenth. 3. We see their Increase and
 Decrease happen not to be at the same season in all. Thus *Scar-*
burgh and *Aswarby* Deficiencies seem to fall out in Winter, when they
 are least wanted; *Stenfield*, in Summer, when there is most occasi-
 on for it. 2. Since *Stenfield*, *Scarburgh*, *Aswarby*, *Malton*, &c. strike
 a deeper Purple by much, and bear either Carriage or keeping,
 better in Winter than Summer; it follows, 1. That they are more
 strongly

strongly and richly impregnated with their Vitriolic Principle in Winter than Summer. 2. That this Principle is more closely united to the Water then; but sits looser, and is more separable, as well as less, in Summer. 3. That where the principal Design of those Waters is as an Alterative, or to remove Obstructions; then such of them as will keep, and are to be drunk at a distance, the sooner in the Spring-season they are taken up, so much better. 4. This sudden flying off of the Chalybeate Principle seems chiefly owing to the Warmth and Rarefaction of the Air; which gives us this Remark, that these Waters bottled up, and carried to distant Places, would retain more of their Efficacy, if taken up, and carried in the Night, and kept in a cold Place. 3. Since a Solution, or Infusion of *Malton*-sediment, Salt and Earth, all turned purple with Galls, in Winter, but not in Summer, we see, that this Water actually contains one Principle more in Winter than Summer, viz. fixt Vitriol; and therefore some Waters may contain a Principle, more or less, at one time than another. 4. We see in *Malton*, *Stenfield*, and *Orston*, before it was altered, the great mischief the Water suffers by too large Reservoirs, in Summer especially, when we find all Mineral Waters are weakest of their Chalybeate Principle, and the very Light and Heat help to dissipate their volatile Parts presently: Therefore such as expect, and want the Benefit of those Waters, are not to be trifled with, and satisfied, before Levels are made, the old Wells taken down, and new small Basons laid in their bottom, so as they may have the Advantage of those volatile Parts, which are by far the most penetrating, inciding, attenuating, and efficacious Alterative in those and all other Waters. 5. From the Oker left in both Bason and Stream of those Waters, and the volatile Vitriol wherewith they are impregnated, we may justly conclude, there is a Solution of Iron-stone; but both Iron and Iron-stone containing much Sulphur, this also is dissolved in the Abrasion and Waste of the solid Stone: Therefore we must undeniably allow Sulphur in all those Waters; which is further evident from their Scum, the Oily Colour of the Oker on the sides of their Current, the blackness and solidness of their Mud, its Inflammability when dried, their liableness to Putrefaction on long keeping, the softening, cleansing, sweetening, drying and healing nature of this Mud or Clay, when applied Plaister-ways to any Ulcer, Sore, Eruption, &c. on the surface of the Body. But of all the Chalybeate Waters I have examined, *Scarburgh* and *Aswarby* contain most Sulphur: For in them, when setid, some part of it may be precipitated and

and fixt. But as this is one of the Volatile Principles, so the Experiment will succeed better, if tried on Water taken up in cold Frosty Weather, or in Winter, than if taken up in Summer. 6. Such of those Waters as contain mostly, or only Nitrous Salt, are in many Cases preferable to those which contain only Marine Salt; the first cooling the Body, and changing into the nature of Animal Salts; the last heats it, and is unchangeable. Hence an Increase of Hectical or other slow Fevers, Thirst, terrible Heat and Excoriation in the *Anus*, &c. upon their Use; unless the Design be to heat, stimulate, and rouse up the Body; and then Waters impregnated with Marine Salt come in play, and have the preference. 7. We find from Experience and Observation, that all those Waters drank in the same quantity, purge in proportion to their Salts. Hence *Scarburgh*, *Malton*, *Stenfield* and *Aswarby* are the only Waters we have in these Bounds, whose quantity of Salt entitle them to this Class. *Thirsk*, *Cawthorp*, *Ansby*, *Orston* and *Walcote*, which are only gentle Laxatives, but strong Chalybeate Diuretics, are properly placed between the Purging and Diuretic Waters, and therefore allied to both *Retford*, *Tibshelf* and *Sempringham*, are no more than plain Chalybeate Diuretic Waters; and when they operate otherwise, it is from the mere Weight and Quantity of the Water drank, and the Laxness and Slipperiness of the Bowels of the Drinker; and the like quantity of common Water will go near to do the like. Therefore they have no farther pretension to this Class, than what common Fame gives them. 8. We find from Experience, that the simple laxative, but strong Chalybeate Waters, containing a brisk Mineral Spirit, and volatile Vitriol, are more diuretic, deobstruent, strengthening and invigorating, than simple strong purgative Waters. 9. We also observe, that such Waters, as either boil up impetuously, like a boiling Pot, or perpetually throw up Strings of Bubbles, are, of all others, most spirituous, and therefore the lightest upon the Stomach, powerfulest Diuretics, and go soonest and easiest off the Body. 10. From the Change of Colour in those Waters upon stagnation, long keeping, or the like, we see are thus impoverished by the loss of their Mineral Spirit, and their tendency to Precipitation, when this is gone, and that their Earth exists in much larger Particles than their Salt; therefore more liable to Gravitation, and the more so, as it contains a Metallic Body, *viz.* Iron. 11. Since those Waters are mostly impoverished, and made so much worse by standing, carrying or keeping, then such as
would

would have benefit by them, are to repair to the Fountain-head, where they may have them to all advantage.

From these few Inferences, a great many *Scholiums* may be drawn, everfive of many Errors, both in Theory and Practice, besides what I have already said, or will afterwards occur. But my Work yet remaining, will not suffer to expatiate. Therefore proceed we to the next Class, which shall be as an Appendix, viz,

L I

PART

PART III.

Of the Diuretic Chalybeate WATERS.

133. COME we now to another Class of the same sort of Waters, but which operate after another manner, viz. by Urine; and whose whole Vertue depends upon their volatile Principles, without any regard to their minute, inconsiderable fixt Parts; which are so small, that they deserve very little notice, as they can answer but very insignificant Ends. The most noted and ancient of those, is the *Tunewhet-Spaw* at *Harrigate*, which was first discover'd by one Mr. *William Slingsby*, about the Year 1571, and was wrote upon by Dr. *Dean* of *York* in 1626 ^a.

134. *Harri-*

^a *Spendarine Anglica*, or the *English Spaw* Fountain; being a brief Treatise of the acid, tart Fountain in the Forest of *Knaresburgh* in the West Riding of *Yorkshire*: As also a Relation of other medicinal Waters in the said Forest. By *Edm. Dean*, Doctor in Physick, *Oxon*, dwelling in *York*; in 4to. p. 32. London, printed by *John Grismond*, 1626.

At *Knaresburgh* the Pole is elevated fifty four Degrees and twenty Minutes. The Town is fenced by the River *Nid* on the South and West Parts, beautified with two Stone-Bridges and an ancient Castle, just by *Knaresburgh-Forest*, and the King's Park, *Bilton-Park*, well stor'd with Deer. The Town stands on a Hill, having a Descent on all sides, situated among sundry fruitful Vallies. The Water is good, the Air dry and clear. In short, it's well provided with all Conveniencies of Life.

Ch. 2. No Place in this Nation can boast of such Diversity of Earths, Quarries of Stone, Minerals, and Mines of Metals, and all this at a very small Distance: For here we have white and yellow Marle, Plaister, Oker, or Rubrie Free stone, hard gritt Stone, a soft reddish Stone, Iron-stone, Brimstone, Vitriol, Nitre, Alum, Lead, Copper, and many other Minerals might be found out by the Diligent and Ingenious. All which demonstrate, that Nature has stored this little Territory with a greater Diversity of hidden Benefits, than great and spacious Countries, otherwise abounding in outward native Commodities; and that the Fountains hereabouts must partake of their Nature and Properties.

Ch. 3. Of Springs, we have Plenty, and of such Reputation, that two of them are Sained, viz. *St. Mungo's* and

134. *Harrigate* lies sixteen Miles West of *Tork*, ten Miles North of *Leeds*, seven Miles South of *Rippon*, two Miles West of *Knaresburgh*, fourteen Miles North-East of *Bradforth*, fourteen Miles East of *Skip-ton*. It's situate on the North-East of *Knaresburgh-Forest*; a Place that may justly challenge *Britain*, and perhaps all *Europe*, for its great Number and Variety of Mineral Waters: But at present we shall only treat of its Chalybeates: The first whereof is the Allum-Well in the Bogg, which has a Stone-Bason for its Receptacle; tho' at present there is no occasion for it, this Spring having found some other Out-let; but might easily be restored to its former Channel. About this Alum-Well is first black Peat-Moss, about half a Yard, or two Foot deep: Under this, mixt with it, are Heaps of Con-

and *St. Robert's Well*; to which have flocked for Bathing, innumerable Herds of People these last two Years, tho' they contain no Mineral, and are of no credit at present; for Superstition and their Reputation live and die together; their great and famed Cures having been rather feigned and imaginary, than real.

Ch. 4, and 5. Besides great plenty of Springs of common Water, we have here Five worthy the Physician's Observation; the first whereof, over-against the Castle, is called the *dropping Well*, because it drops, distils and trickles down from the Rock above; the Water whereof is of a petrefying nature, turns every thing to a stony Substance in a short time. At first it rises up not far from the said Rock, and running a little way in one intire Current, till it comes almost to the Brim of the Cragg; where being opposed by a Dam (as it were Artificial) of certain spongy Stones, it afterwards is divided into many smaller Branches, and falls from on high. It's said to be very effectual in staying any Flux of the Body. Three other Wells, being much of the same nature, are called by the Populace, *sinking Wells*; because they have a fetid Smell, consisting most of *Sulphur vive*. One of them, that has the greatest Stream of Water, is in *Bilton-Park*; the other two are

in the Forest; one is near the Town, the third is two Miles beyond *Harrigate-Head* in a Bottom, on the Right-hand, and almost at the side of a little Brook. These are sulphureous Fountains, and cast forth a stinking smell afar off, in the Winter-season, and coldest Weather especially. They are very cold, and have no manifest Heat, because their Mines and Veins of Brimstone are not kindled under the Earth, being hindred from the Mixture of Salt therewith. Such as drink the Water verily believe, there is Gunpowder in it, and they vomit it up again. They leave upon Grass, Leaves, and Sticks in their Currents, a grey slimy Substance, which being set on fire, has smell of common Sulphur. They are much haunted with Pidgeons, from their contained Salt. White Metal dipt in them, presently becomes like Copper. They have the same Properties with other cold, saline, sulphureous Baths. The common People drink them, and they expel Reef and Fellon. They soon help and cure by Washing and Bathing, Itch, Scab, Morpew, Tetters, Ringworm, and the like. But this would be sooner and more conveniently done at that in *Bilton-Park*, were it divided into two capacious Baths, the one naturally cold, and the other artificially kept warm some Hours in a Day. The fifth is that on which I principally write: It's an acid

Concretions of green Vitriol both mature and immature, prodigious quantities of Sulphur, and much Earth, which calcin'd answers the Loadstone. Under these, is a Bed of Clay two Foot and a half deep, without any sensible Marly of Sulphur, except where the Sulphur Waters rise. There is a good Descent from this Bog, to carry off the Water from it into the Brook. About half a Mile from this, they have several times, and in sundry Places, boared for Coal, and found the following *Strata* of Earths; first, Moss, then whitish blue Clay four Yards thick, then Gravel two Yards thick; lastly, Shale twenty Yards thick. Here they could go no lower, finding the Water come in with the impetuous force of a subterranean Current; but never got through this

cid or tart Fountain in the said Forest, commonly called the *Tarwhet-Well*, or *English Spaw*; the last, in imitation of the famous German Chalybeate, viz. the *Sauvenir* and *Ponhon*.

Ch. 6. This fifth Spaw is a Mile and half from *Knaresburgh*, up a very gentle Ascent, near *Harrigate*, has much the same Situation with the foresaid Spaws in Germany. It was discovered first about fifty Years ago, by one Mr. *William Slingsby*, who had travelled in Germany in his younger Years, seen, and been acquainted with theirs; and as he was of an ancient Family near the Place, so he had fine Parts, and was a capable Judge. He lived some time at a Grange-House near it; then removed to *Bilton-Park*, where he spent the rest of his Days: He using this Water yearly, found it exactly like the German Spaw. He made several Tryals of it, then walled it about, and paved it in the bottom with two large Stone-Flags, with a Hole in their sides for the free Access of the Water, which springs up only at the bottom, through a Chink or Cranny left on purpose. Its Current is always near the same, and is about the quantity of the *Sauvenir*, to which Mr. *Slingsby* thought it preferable, being more brisk and lively, fuller of Mineral Spirits, of speedier Operation; he found much benefit by it. Dr. *Tim. Bright*, about thirty Years ago,

first gave it the Name of the *English Spaw*: Having spent some time at those in Germany, he was Judge of both; and had so good an Opinion of ours, that he sent many Patients hither yearly, and every Summer drank the Waters upon the Place himself. And Dr. *Anthony Hunter*, late Physician at *Newark upon Trent*, often chided us Physicians in *York* for not writing upon it, and deservedly setting it upon the Wings of Fame.

Ch. 7, 8, 9. Experience and Tryals do sufficiently satisfy us, what Minerals this Water passes through, and imbibes; but their Quantity we know not, nor in what Proportions they are mix'd. That Vitriol is most predominant, is evident from its Tartar and Inky Taste and Smell, like the ancient Spaws. And as much powder'd Gall as will lie on a Silver Twopence, turns a Glass-full of this Water of an exact Claret-colour, at the Spring-head; but not when it's carried; for it strikes a faint Purple at *York*; and carried yet twenty or thirty Miles further, it differs not from common Water: For having more of the Spirit, and less of the Minerals of the *Sauvenir-Spaw*, it keeps shorter time, is not to be transported far off; but having a thinner, and more spirituous Body, more airy, subtil, and piercing Exhalations, it's of a quicker and brisker Operation, tho' it vanish and fly off, which is a most inestimable Property

this Shale. Twenty two Yards South-West of the Allum-Well, is a Chalybeate Spring; and in a plow'd Field or Intack, call'd the *Parson's Intack*, about two hundred Yards South-East of the Bogg, when the Ground is new-plow'd, or harrow'd, and has had a Shower of Rain, follow'd with a bright Sun beam, there are found beautiful, small, hard, transparent Stones, call'd Diamonds, from their

perry of this rare Fountain, tho' as such, only valuable at the Spring-Head. The Qualities of Vitriol are by ancient Physicians found to be healing, drying, binding, resisting Putrefaction, and a Strengtheners of the inward Parts: It kills flat Worms in the Belly, cures the Venom of Mushromes, preserves spongy Flesh from Corruption, dries, heals and dissipates it, expressing the superfluous Moisture, is profitable against Plague and Pestilence; its Oil and Vitriol are diuretic, excellent in the Stone, Stoppage of Urine, &c. And the Chymists think, that out of Vitriol might be made all kind of Medicines necessary for the Apothecaries Shop. And though Vitriol, which is hot and dry, be the predominant Principle here, yet the Water has not that Heat and Acrimony, so as to be either unprofitable or hurtful: For this, and other like Springs have their Vitriol but weakly, and that with a Mixture of divers other Minerals of opposite nature; and also this Mineral is in so small a Proportion to the Water, that it's scarcely perceived.

Ch. 10. Tho' this Water cool at first, yet after some Days drinking, it heats and dries: But it affects sundry ways, cooling some, healing, moistening and drying others. But Waters impregnated with this Vitrioline Principle, presently heal, and as it were, miraculously cure Diseases, which were beyond all hopes of Recovery. They pass the Meanders and Turnings and Windings of the whole Body, sweeping away whatsoever hurts or endamages it, not touching what is useful, contracting and strengthening what is flaccid and loose, relaxing what's

contracted, inciding, attenuating, dissolving and expelling what is gross and thick. This Fountain especially, has an incisive and absterfiv Faculty, to cut and loosen viscous and clammy Humours of the Body, and to make the gross movable; as also by its piercing and penetrating Power, subtilty of Parts, and by its deterging and desiccative Qualities to open all Obstructions and Oppilations of the Mysentery (from whence spring the Seeds of most Diseases) Liver, Spleen, Kidnies, and other inward Parts; and to cool and to temperate their natural Heat, helping and removing also all the Grievs and Infirmities depending thereupon. From the Astringency of its Mineral it comforts the Stomach; so that, of a thousand, who shall drink it directly, and with good Advice, (after due Preparation, as the Case requires) scarce one but who shall receive much Benefit by it. It cleanses and purifies the whole Mass of Blood, by purging it from the peccant Serosities, Choler, Flegm and Melancholy, and that chiefly by Urine. The Drinkers Stools are commonly black, or of a dark Green, from the Mixture of the Minerals with the Aloine Feces. Hence its several and different visible Effects and Property in evacuating the noxious Humours of the Body, mostly by Urine, when there are any Obstructions about the Kidnies, Ureters and Bladder; or by Urine and Stool both, when the Mysentery, Liver and Spleen are obstructed. But if the Grief be Uterine, it relieves it according to the usual manner. It purges Melancholics by Hamorrhoids, and Cholerics by Siege; rarely vomits or sweats. As it promotes diminished, or restores

their Weight, Transparency, Hexagon, Figure, and cutting of Glass, in bigness, from a Pin's Head, to a Bean; but it's very rare to find one of the last Magnitude perfect. The North-East End of the Morass

restores obstructed Evacuations; so it stays the superfluous.

From these many and several Operations and Effects (from Minerals of a different nature mixt) it performs Cures, which few or no Medicines artfully compos'd can do. Wherefore when 'tis drunk, with due Caution and Advice, it's beneficial in the following Maladies: It dries the too moist Brain, and helps Rheums, Catarrhs, Palsies, Cramps, &c. It's good against inveterate Head-achs, Megrims, Vertigo, Epilepsy, Convulsions, and the like cold and moist Diseases of the Head. It cheers the Spirits, strengthens the Stomach, causes a good and quick Appetite, and promotes Digestion. It's good in the Black and Yellow Jaundice and Hippo, as also in a Cachexy, and beginning Dropsy, seeing it opens Obstructions and expels redundant Serofities. It cools the Reins, Ureters and Bladder, with its Neck and Sphincter; expels Sand, Gravel, and Mucus, and prevents their Generation afresh. It cures Ulcers, Fistula's, or other Sores of those Places, or in the *Perinaum*, by its cleansing, sarcolic, cicatrizing, and corroborating Quality. It's no less profitable in the sharpness, difficulty, or stoppage of Urine: But if the Stone is too large, we are not to expect Relief: Or where the Wound after Lithotomy is slow in Cure, it certainly facilitates, hastens and perfects it. It's of remarkable service in old Gleet. There are few Diseases peculiar to Women, which it will not cure, with good Advice and proper Management; as, the Green-sickness, too plentiful, frequent, deficient, or irregular Menses, *Fleur albus*, too great Humidity and Slipperiness of the *Uterus*, which this Water dries, strengthens, and restores its Retention and Fecundity. Many are the instances we have seen of those. It's no

less serviceable in schirrhous and cancerous Tumours, Ulcers or Sores of the *Uterus*; but then the Water must be both drank and injected: But such as are with Child, must refrain both. It kills and expels all sorts of Worms in the Body, and prevents their Generation anew. But the Excellency of the Sulphur-Waters appears chiefly in Cutaneous Cases.

Ch. 12. But after all, it's not the Knowledge, but the right and seasonable use of It, that makes it beneficial; and herein it shares the common Fate with Food and Physick, the Abuse or unseasonable use whereof often do much mischief. Let the Patient then consult a Physician, who understands the nature of the Water, whether it's proper in the Case offered, or not. If the first, let the Patient repair thither at a fit season, without long and tedious Journeys to fatigue himself. When come, let him rest a Day or two, and in the Interim prepare his Body with some gentle Lenitive, suited to his Distemper and Constitution. First of all, give an emollient Glyster; for these carry off the Excrements, clear the Intestines, and make an open Passage for the Water, without its carrying those Impurities into the Blood. And even in the hottest Season and Dog-Days, these Lenitives, being mild, weak and safe, can do no mischief, especially in those Northerly cold Climates. Bleeding also in plethoric Habits will be of service, however an old, riveted and often fatal Error hath prevailed to the contrary. But it is now full time it should be kick'd out of doors: For tho' purging Medicines may, and do increase the Blood's Motion and Rarefaction, in very hot Weather especially, and may thereupon be inconvenient or dangerous; yet in our cold Country there is no fear of this from such Lenitives,

Morass or Bogg, lying naked from all Grass, is candied over in the Summer-time with Salt, a part whereof is daily pick'd up by great Flocks of Pidgeons, which resort thither from all Parts. About an hundred Yards South-East of the Three Sulphur Wells, is a small ouzing Chalybeate, rising out of a small shaly Ground. Half a Mile

rives, or other necessary gentle Evacuati-
ons. All the ancient Purgatives were so
strong, that they are now quite laid aside,
and very rarely, if ever, used. There-
fore Hippocrates had good reason to for-
bid them in the Dog-Days, and we more
particularly, are not to use such with our
Mineral Waters.

Ch. 1, 13, 14, 15. As to the properest
Season for the use of those Waters in the
general, they may be drunk whenever the
Air is pure, clear, hot and dry; but re-
frain drinking, when the Air is cold,
moist, dull, and misty: But the fittest
time seems to be from the middle of
June, to the Middle of September; for
then the Air is generally in the first state:
And if there has been much Rain fallen,
let the Well be laded dry, before ye be-
gin to drink; the best time for which,
and Exercise, seems to be from Seven to
Ten a clock in the Morning. Exercise
promotes the Distribution of the Water,
and their Effects and Evacuation: The
Strong may walk to it, the Weak ride,
and the Sick drink it in their Chambers,
having it brought to them directly, in
Bottles close corked, and kept in a cool
Place. The Quantity to be drunk, be-
longs to the Physician attending, to be de-
termin'd. But, in the general, begin with
a moderate Dose, and by degrees increase
daily to three, four or five Pints; and to-
wards the End make the like proportiona-
ble Abatement daily. It is not safe to drink
too much, lest they load and overcharge
Nature; a lesser Quantity, and drunk
for a longer time, will answer much bet-
ter and safer. But the due Quantity must
ever be judged, from its due and ready
Digestion and Evacuation. The Morn-
ing drinking is sufficient; and fast three
or four Hours after it: But if Necessity,

together with the Physician's Advice, call
you to drink it twice a day, dine sparing-
ly, and drink none for four hours after;
but exceed not the half Quantity you
drank in the Morning. Let the drinkers
use a moderate quantity of Meat and
Drink, of light and easy digestion, good
and wholesome, affording laudable Juice;
but such as breed crude and bad Humours
must be refrained, and also Variety of
Dishes eaten at the same Meal; and all
Pickles, Spices, Sauces, Fat, &c. in dres-
sing. They must also avoid all salt Meats,
Beef, Bacon, Pork, Lard, and larded
Meats, Hare, Venison, Tripes, and all
other Entrails of Beasts, Blood-Pudding,
Geese, Pigs, Swans, Teale, Mallard, and
all other Water Fowl, being of hard Di-
gestion and ill Nourishment. And among
Fish, Salmon, Eels, Lamprey, Herring,
and salt Ling, all salt Fish, Sturgeon, Oy-
sters, Anchovies, Cockles, Mussels, and
Shell-fish. I likewise disallow of the
white Meats, Milk-Curds, Cream, old
Cheese, Custards, white-Pots, Pudding-
Pies. Of Fruits, Apples, Pears, Plums,
Codlings, Goosberries, and all such
Summer Fruits, either raw, or in Tarts
and Pyes; and all Peas and Beans, cold
Sallads, raw Herbs, Onions, Leeks,
Chives, Cabbage, Coleworts, Pompions,
Cucumbers and the like: Nor should
they use much Exercise after Dinner;
nor sit heavy, sullen, dull, musing or
slumbering; but a little gentle walking,
or chearful Conversation. Let therefore
their Diet be Hens, Capons, Pullets,
Chickens, Partridges, Pheasants, Turkeys,
and generally all Wood and Mountain-
Fowls; Veal, Mutton, Kid, Lamb, Rab-
bits, young Hare, Leverets, &c. and these
rather roasted than boiled, except Use or
Constitution require the last. Of Fish,
Trouts,

Mile South of this, in a Bottom, within a Span of a small Rivulet-side, between two very easy Descents, rises *Tuewhet-Spaw*, out of a Moss above. Blue Clay below, and Shale under that. This, for Antiquity, challenges the Precedency of all the Mineral Waters in *Yorkshire*, being the only Chalybeate in the County, either known or used. Then, and long after, Dr. *Bright* and Dr. *Hunter* were its first Promoters; then came our Author: So that we see, the Authors of the *Magna Britannia* are out in their guess, near fifty Years, by their jumbling *Scarburgh* and this together. Dr. *Michael Stanhope* ^b of *Tork*

Trouts, Pearches, Loches, and all scaly Brook and River Fish; Smelts, Soales, Dabbs, Whittings, Turbut, Gurnet, and all such other that are not heavy and unwholesome. These may be altered with Mint, Hyssop, Anise, &c. Also Cray-fish, Crab-fish, Lobsters, and the like; Raisins with Almonds, Bisket-Bread, Marshpan stuff Suckers &c. well kneaded and leaven'd white Bread, old well-brew'd Beer, but not stale, tart, sharp or sour; nor by any means let it be mix'd with *Spaw-Water*. Instead of Cheese at Meals, eat candy'd Lemon or Citron-Peel, or Comfits of Anise, Fennel, Carvy or Coriander, to warm and strengthen the Stomach, and expel Wind; sweet Butter, new Cream Cheese.

Ch. 16. Tho' Accidents seldom intervene to the Strong, on the use of those Waters, yet sometimes Inconveniencies may accrue to the Weak; as, their Retention in the Body, Inflation of the Belly, Costiveness, and the like. Wherefore, to cause a speedy Passage of it by Urine, let the Patient go into his naked Bed an Hour or two; it warms, relaxes the Passage, and the force and weight of the Waters make way. Let warm Cloaths at the same time be apply'd to the Stomach, but not to provoke Sweat: Or if the Person can bear it, pretty brisk Exercise: But both these failing, throw up a stimulating Glyster. For a Fulness or Inflation of the Belly, walk about, eat Carminatives, and inject a Glyster of the same sort. For Costiveness, eat moist mollifying Foods and Herbs, as Raisins, Prunes,

Tamarinds, Butter, Yolks of Eggs, &c. in Broth. If these fail, give some Lenitive Medicine, and forbear the Water a Day or two, till the Passages are opened.

^b Cures without Care; or, a Summons to all such as find little or no help by the Use of Physick, to repair to the Northern *Spaw*; wherein by many Precedents of a few late Years, it's proved to the World, that Infirmities, of their own nature desperate, and of long continuance, have receiv'd perfect Cure by Virtue of Mineral Waters near *Knaresburgh*, in the West Riding of *Yorkshire*, &c. by *Michael Stanhope*. London, Printed by *Will. Jones*, 1632, in 4to. P. 32. Dedicated to the Right Honourable the Lord *Wentworth* of *Wentworth-House*, Baron *Newnham* and *Oversty*, Viscount *Wentworth*, &c. &c.

Preface. That our Water we are about to describe, partakes of Vitriol, is evident from its rough harsh Taste, like that of Vitriol. 2. Its Inky and Vitriolic Smell. 3. Galls or Oak-Leaves turning it Purple. 4. An Oak-stick bruised at the End, and the Water stirred about with it, turns of a Sapphire-Blue. 5. Its leaving so much Oker in its Channel. 6. The whole Soil where the Water rises, is full of Iron-stone; and the former Iron-Works here have occasioned the total Consumption of the Wood on the Forest. Within half a Mile of the *Spaw* are still to be seen the Ruins of a great Iron-

York, was the next Writer on this *Spaw*, in 1631; who gives us a Catalogue of Cures performed by this Water; some whereof are perhaps the greatest and most remarkable, filed up in the Authentic Records of Physic, down from *Hippocrates* to this Day. But he also

Iron-Work; and by digging a little, you may still find Plenty of Iron stone in most Places, even exposed to the Day in broken Banks on the Earth's surface. 7. The Drinkers Stools are blackish, or deep Green. 8. The Efficacy of the Water in all sorts of Obstructions, proves it to be Martial. If any is incredulous to the Virtue and Efficacy of those Waters, let him pause a little, and reflect on the Properties of its impregnating Ingredients, and they will be better satisfied: As first, Sulphur, which attracts, resolves, mollifies, dissolves, cools and dries. 2. Salt is astringent, deterging, purging, dispersing, attenuating, and preserves from Putrefaction. Iron is both of a deobstruent and astringent nature. 4. Vitriol heats and binds, is of very subtil Parts, and of a penetrating nature. Hence these Waters loosen and scatter viscous and clammy Humours, attenuate the Grosse, and open the Passages of the Liver, Spleen, Mysteriery, Kidnies, &c. by their penetrating Power.

A true Relation of certain Cures done by the Mineral Waters near Knaresburgh.

Dr. Dean of York having wrote upon, and recommended the *Tuwhet-Spaw*, about six Years ago, in several Distempers, we are now to give an Account of several surprizing Cures done by it. But give me leave to advertize you, that last Year, 1631, I discover'd a new Spring a quarter of a Mile nearer, which exceeds the former on this Account: 1. It's situate on the Descent of a great Hill, has firm Ground and dry Walks round about it: The other lies in a Flat, the Ground about it is Boggy, other Waters sink in, and there is little room for Exercise. 2. This changes sooner and deeper with

Galls than the other. 3. It's lighter, less nauseous, and goes sooner off than the other. 4. It will carry further, and keep better and longer, being put in clean, new close Bottles. 5. Besides the Iron and Vitriol, this has also a little Sulphur, which makes it more Balsamic and healing. Near this, are those Sulphur-Waters of different degrees of Strength, so loaded with Salt, that two Quarts of the strongest exhale, leaves half an Ounce; another as sulphureous, but not sensibly salt; the third, a Mean betwixt both. The first only is used, and has sufficiently play'd its part, to the great Gain of the Drinkers; tho' the other two, if well examined and tried, might be more serviceable to some Bodies. Tho' these *Spaws* ordinarily challenge a Peculiarity in Curing (if curable) the Stone and Gravel, in opening Obstructions of the Spleen, and allaying all melancholy Effects and Passions; yet it will appear, that such Waters have other rare and secret Operations and Influences, to the great Surprize of the Beholder.

But, to the Cures: In 1626, Mrs. Rolf of Hadley in Suffolk, fell into the Gravel, got the best Advice she could; but found no Relief, till she was brought to the *Tuwhet-Well*; in a Fortnight's time she voided an hundred Stones of several sizes; her Pain went off, she recover'd, and continued well. Henry Curra of Wharfedale in the West of York-shire, aged about fifty Years, Servant to Sir Peter Middleton, was a great Sufferer many Years, could neither ride, walk nor move: He came here, and in a Months time, by the Use of the same Spaw, he voided many Stones, several of them as big as Peas: He also recover'd a firm state of Health. Henry Rowley of Linton near Weatherby, aged sixty Years, was long tormented with a
M m stoppage

also discovers, adds and prefers another Chalybeate Water to this, call'd the *Sweet Spaw*, in opposition to the Sulphur-Wells. It's a pity this small Tract is so scarce: But this large Epitome, I hope, will in a good measure compensate that. But it's a greater pity, that

stoppage of Water, till this Spaw opened the Flood-gate, and let off great quantities of Mucus and Gravel, whereby he was restor'd to Health. But most remarkable, and next to a Miracle, was the Recovery of Mrs. *Barker* of *Dore* in *Derbyshire*, aged thirty four Years: She had long a dangerous Ulcer in her Kidnies, a very obstructed, weak, emaciated Body, could not walk over the House, without one or two to support her, had neither Appetite nor Digestion, no, for the smallest Broths; she was returned to her first Food, Womans Milk, maugre the Art of Physick and most Learned Professors. In this weak, low, hopeless State she was brought hither; she, to her poor, small Ability, drunk the Water; in a few days after, she discharged an incredible Quantity of purulent Matter, whereby she was so relieved, that she got strength, recover'd Appetite, and her Obstructions open'd, and in five Weeks was restored to a healthy strong Habit of Body, and next Year returned to the Spaw perfectly well. The like Cure of an ulcerated Kidney did Mrs. *Ellis*, Spouse to Mr. *Ellis*, Minister of *Beverly*, receive here. Mrs. *May* of *York*, of a very great Age, long confined to her Bed, and tortur'd with Fits of the Stone, yet was set intirely at rights here. In Melancholy, and splenatic Illnesses, few, if any at all have missed of perfect Cure; instance, Mr. *Sacheverell* near *Hopton* in *Derbyshire*, who had long led a most miserable, languishing, despairing Life; yet being sent hither by Dr. *Dean's* Advice, met with a most welcome desired Cure. Mr. *Ayre* of *Ramton* in *Nottinghamshire*, in the like most wretched Condition. Mr. *Wallis*, aged fifty Years, was cured of an Asthma by this Water. Mr. *Thompson*, Post master of *Weatherby*, who had been ill twenty eight Weeks of

a Hectic; and in spite of the best and most suitable Advice, was given up for Death; yet applying himself to this Water, in the middle of Winter, was intirely cured in a Fortnight. *Will. Shan* of *Medley* in *Yorkshire*, long troubled with a Stoppage of Water, with most intolerable Pain, in one of his Agonies run an Iron Instrument up his Yard; and pulling it violently back, open'd the Passage for a great quantity of Water and Blood: The Wound prov'd Ulcerous, and could not be healed till he came to this Spaw; where in a few days he was cured both of his Disease and Ulcer. The Countess of *Buckingham* (all other means failing) repair'd hither for the Cure of a severe Asthma, and went back cured. Mrs. *Fairweather* of *York*, having long been troubled with a Swimming in her Head, finding no Relief from the best Advice and Means, till she came hither, and met with a very acceptable Cure. The Lady *Hoyb* of *York*, after she had born four Children, in her 5th was taken with a Swelling, Redness and Knobs in her Face, about the Eleventh Week after Conception; the Pain whereof was so great, that she miscarried of this, and two other Conceptions successively: After some Years spent in this languishing Condition, Physick availing nothing, she came to this Spaw, was cured, and had several Children after. Mrs. *Sadler*, the Daughter of that Famous Lawyer Sir *Edward Coke*, came hither for a long and violent Pain of her Head, and found Relief.

But now for a few Instances of the Sulphur-Water Cures.

Mr. *Fowles*, an Advocate in *Edinburgh*, aged fifty one Years, from a Weakness and Relaxation of the Solids, had lost Use

that these noble Fountains should sink in their due Reputation. And indeed, this will not be the Fate of this only, but of all our other most Celebrated Waters, in a little time, these Places being no longer the Hospital of Invalids, but too often the Rendezvous of Wantonness, and not seldom, of mad Frolicks; which should be the shame of human Nature, and all rational Minds, as they are the Contempt

the Use of both Hands, and all his Limbs; after a Months drinking of the *Spaw*, and bathing in the Sulphur-Water, was perfectly cured. The like Cure in the *Palſie* they performed upon Sir *Thomas Vassor's Lady*. *Maud Bogg* of *York* had a prodigious swell'd Leg for many Years, which made her perfectly lame; she was cured in three days, by drinking plentifully, and washing in this Water. Another poor Man, of a long and very hard Swelling on his Knee, which was cover'd over with thick, long and strong Hair, and had given the defiance to all other Applications; he came hither, bath'd the Part often, and drank freely of this Sulphur Water, the Tumour broke and discharged incredible Quantities of Worms, and he soon after returned home perfectly cured. Another poor Woman it cur'd of a large Swelling in her Breast. One *Smith*, a Shoemaker in *York*, was so overrun with the Scurvy, that his Life was in danger, Medicines being of no service, was prevail'd upon to drink the Sulphur-Water at home in the middle of Winter, which cured him in a Month. There is nothing more common, than for People to frequent this Sulphur-Well, and get cured of their Ulcers and Sores, by washing in it. What are its inward Uses we know not yet.

There is also a dropping perrifying Well, which cures Fluxes of the Belly; Instances whereof we have seen. May not *Knaresburgh* challenge all *Europe* for variety of useful Springs? If some from Prejudice and Peevishness, will say, that some have gone there, and reaped little or no Benefit, I answer, 1. All Distempers are not curable. 2. Did they take and follow proper Advice for a sufficient

time? 3. Did they use that Water, which was most suitable to their Case? But, be sure, let Strangers that come for their Health, take the following necessary Rules along with them: First, take the Advice of some ingenious Physician, who is a Judge of the nature and properties of those sundry Waters, and the Patient's Case. 2. For a day or two use such Preparations as he shall judge most convenient. 3. Be regular and moderate in Diet during the Use of those Waters. 4. Suit the degree of your present Heat or Cold to the present Season of the Weather. 5. Be armed with Patience to wait the Issue of those Waters for a convenient time, which is ordinarily a Month. 6. If the Waters work kindly, do not mix them with any other Physick. In other things, let them consult Dr. *Deane's Spadacrene* above. Our *Spaw* can in Justice yield to none in *England*, for the great Consequence and Variety of its Springs, there being a great many sorts within two Miles of one another. Had they but one Year such an ingenious Examiner as Dr. *Jordan*, we might expect Nations to flock to them. Their Situation is barren; necessary Conveniencies and Accommodations are wanting. It might be reasonably expected, that some cleansed Leper would have some Acknowledgment and Gratuity for their Cure, by the Hand of bountiful Heaven; especially when Physick had failed. Means had proved ineffectual, Health lost, and Life in great danger, and the present Days miserably suffering. And sure, here is Occasion enough for Charity: 1. For providing necessary Conveniencies at the *Spaw*. 2. For the Relief of such Poor as come for Health, and must therefore

Contempt of sober Men. That Temperance, Moderation, and a strict proper Regimen, which People were then willing to comply with, are now turn'd to Ridicule. Hence the poor People of mean Circumstances, and such as have the Fortune to board in clean poor Peoples Houses, mostly find Relief; but the Rich seldom. Luxury, Intemperance, unseasonable Hours, Idleness, and Gratification of Taste and Appetite, are become so fashionable. Before, ordinary People could afford to stay at moderate Expences, till they got well: But now it's become so chargeable, that the greatest part cannot possibly stand it any time, without injuring themselves and Families. After Drs. *Bright, Hunton, Dean, and Stanhope*; Dr. *John French* was its next Patron; who examin'd it, and celebrated its Praises

live here upon Charity, or starve; and for these only. 3. Many Parishes hereabout have not Divine Service above once in a Year: Some Encouragement for frequent Preaching might do well. *Finis.*

c. The *Yorkshire Spaw*: Or, a Treatise of Four famous Medicinal Wells, viz. the *Spaw*, or Vitrioline Well; the stinking, or Sulphur-Well; the dropping, or petrifying Well; and *St. Mungo's Well* near *Knare-burgh* in *Yorkshire*; together with the Causes, Virtues and Uses thereof. By *John French*, M. D. 1654, 12^o. p. 134.

Ch. 1. As this Town was formerly famous for its invincible Castle, built upon a craggy Rock; so is it now, for its Four notable Medicinal Springs, first wrote upon by Dr. *Dean*, who mentions Five, but they are only Three: For tho' the Sulphur-Waters are all the same, yet he makes them Three, and rejects *St. Mungo's Well* as an useless and superstitious Relict of Popery; which has of late, however, regain'd its Reputation; and therefore deserves a Place among the rest. The nature of that Country, especially South-West, is very Rocky, yet Moorish and Healthy, consisting of an unctuous, bituminous Earth, which the Country-People dig up in Turf and Peat, dry it, and burn for Fuel. Dr. *Dean*

has given us before, the sundry sorts of Earth, Stones and Minerals hereabout.

Ch. 2. Is on the Origin of Springs in general; where he rejects their Opinion; who derive their First from Hail, Rain, Dew and Snow. 2. Theirs; who say, they are generated in the Bowels of the Earth, from Air, &c. But 3^{dly}, he closes in with them, who derive them from the Sea, by subterranean Channels. But Heat being altogether, and absolutely necessary for rarefying Water into a Vapour, and there being much Heat requisite to the raising much Vapour, he enquires, first, whence this Heat proceeds not. 2. Whence it arises, And 1. It's not from the Sun, seeing its greatest Heat in the warmest Climate is found by Miners, never to penetrate above six Foot deep at most. Nor 2. From an Antiperistasis of the cold Air in the surface of the Earth: For this has no place further than the warming Force of the Rays come. But to know truly from whence this Heat proceeds, he examines, first, the Cause of Heat in the the Hot Baths. And this is neither from the Heat of the Sun, nor from the struggling of Winds in the Channels of the Earth; nor from Sulphur, nor *Calx viva*: For the first heats not, except it be actually hot; nor the last, except when it is dissolving in Water: Nor is it from the Fermentation that's in the Generation of Me-

Praises, in Writing, in 1650,—1. but the Troubles in the North gave him some Uncasiness.

135.

Metals and Minerals, caused by the agent Spirit acting upon the patient Matter, and so producing an actual Heat: For when the Metal is generated, that would cease, and never return, except the Ground be first digged and wrought up, and new space and room made for a new Production of the same. 2. Should the Generation be longer continu'd, their Extension must still be further, whereby the Hot Bath must often be shifting. Again, were this Cause true, then wherer are Metals and Minerals, there would be Hot Baths; which is false. But besides, how is the crude metalline Matter, previous to any Fermentation, sublimed from the central Parts of the Earth towards its Surface, if not by a subterranean Heat? But hot Springs are from a Fire, which burns in the very Cavities and Caverns of them; these Cavities themselves consisting of a bituminous Matter, kindled in Water, and feeding the Flame; and this is after the same manner as Distillation, or boiling of a cover'd Pot, where the Water rising up in Vapour, is again condensed into Liquor; with these differences only, that in the last two the Fire is under them, and without them; but in this, the Fire is within the Cavity it self, through which the Water passeth, either in its Bottom, or sticking to its sides. This Fire forces the Water into Vapours; which ascending through the Crannies, Veins, and Fibres of the Earth, there it is mostly turned to Water; and with the rest of the Vapour break with hot Fountains full of Spirit; which seem to boil, except the Fountains be pretty remote from the Caverns, and then it's only tepid, or warm, &c. and their Waters have not so bituminous a smell. Now, that the Matter of this Fire may neither be temporary, nor shift Places, this *Bitumen* is perpetually generating, while there is Moisture and Dryness in the Earth, just as Metals are renovated in the same pla-

ces. 2. The Sulphur and *Bitumen* being melted by the Fire, follow the *Flamen*, so as it still keeps in one place. The Waters have neither Taste, Smell nor Colour of *Bitumen*, being heated by Rocky Earth, &c. heated (I say) by the Fire under them. But if they come immediately from the *Bitumen*, they have its Taste and Smell. The subterranean Fire has no want of Air: For there is great plenty of it under Ground; therefore will *Aristotle* have all Springs generated of it. Neither is Air the Aliment of Fire; but unctuous Vapours, which arise from the burning Matter, the Smoke and Fumes whereof being subtil, recoil not upon the Fire to choke it; but either penetrate and shale through the Surface of the Earth, or incorporate again with some suitable Subjects in the Earth. This cannot seem incredible to such as believe the Credibility of Sepulchre burning Lamps. 3. The Fire is in proportion to the Vent and Exhalation; where these are great, it's great, & *é contra*. This *Bitumen* is kindled by hot and dry Exhalations shut up in the Bowels of the Earth, which wanting Vent, are agitated, attenuated, rarefied, take Fire, and fire this *Bitumen*.

Ch. 3. Treats of the strange Variety of Fountains, and other Springs.

Ch. 4. Of the Nature and Virtues of Simple Waters; of its inward Use, either as curative, or preventative of Diseases; and so comes to the outward Use of both warm and cold Water. Bathing in the last was used by the Ancients, by way of Exercise, for Swimming, which Lord *Verulam* says, makes the Flesh hard and compact, conducing to Long Life. This is useful for astringing the Body, and condensing it, when the Pores are too open, whereby it excites an Appetite and good Digestion, promotes Evacuations, represses a canine Appetite, stops Hemorrhages, and a Gonorrhœa, cures a
Hydro-

135 To find out the Nature and Differences of these two Chalybeates, I made the following Experiments on them, and the Allum-Well Water, especially, as Dr. Stanhope had prefer'd and advis'd the Use of the Sweet Spaw to the former: Therefore a narrower Inspection of both was necessary, that we might thereby discover on which side Truth laid. As to their Situation, the *Lewket-Spaw* lies a quarter of a Mile South of the Sweet Spaw, and at least twelve Yards lower, in a Bottom between two Hills, very close upon its impregnating Minerals. This Bogg, where it is, might quickly be drained, and dry Walks made near it, at small Expences. Its

Hydrophobia, and several sorts of Fevers. But Youth and Old Age must not use it: For it prevents the Growth of the first, and extinguishes the languid Heat of the last. It also chills delicate and tender Women too much. Nor is it fit for sickly Persons, except they are of strong Constitutions, and the Humours concocted and fit for Evacuations, and none of the Noble Parts diseased or unsound. If you bathe for Cooling, and not Moistening, anoint the Body with Oil before you go in. *Thermæ*, whether tepid, warm or very hot, are all good in different Intentions: For the last rather dries than moistens, contracts the Skin, and condenses its Pores. In this case therefore, it is proper where the Cold Bath may not be suitable. The moderately warm is useful and necessary in sundry Cases: It draws from the remote internal Parts, digests hot Vapours into Humours, dilates the Pores, and makes way for the Discharge by the Skin. It moistens a dry Body, is therefore good in Hectic Fevers, Itch, Scab, &c. attracts Nourishment to the extreme Parts, where it came not before, by reason of some Obstructions. It allays the Sharpness of the Humours: In all which cases it is as much, or rather more effectual than any other Physick. Tepid Baths cool and heat at the same time, and answer the same Design as Hot Baths, but more remissly. Sitting in warm Water up to the Navel, relaxes and softens the Hardness of the Belly,

provokes Urine, mitigates Pains of the Stone and Cholick.

Ch. 5. Brings us to the several kinds of Minerals in Mineral Waters; and these are chiefly Four, *viz.* Metals, Minerals, Stones, and Earth; and of these, sometimes the Vapours only are mix'd, and sometimes the Juice only, whilst they are *in principiis solutis*. Lastly, the Substances themselves, in a threefold manner: For 1. Some are so united to the Water, that they can never be separated: For in Decoction or Distillation they rise and dissipate, or are collected with the Water, still constituting but one Form. 2. Some are confusedly mix'd, and separable by Precipitation. 3. Some have an Union betwixt both, as Salt. The Reasons of this Mixture, are first, the difference of the Heat that should unite; or, 2. Of their Continuance together; or, 3. Of the Aptness of the Things to be mixed.

Ch. 6. As to the Origin of Vitriol, and Vitrioline Waters, their difference and different Operations. Vitriol is an esurient Salt of the embryonated Sulphur of Copper, or Iron; which attracting an Acidity from the Air or Waters, is thereby open'd or resolv'd, and then corrodes the Parts of the said Metals, with which it's connate; the Body of which Compound consisting of pure Metal, and superfluous Sulphur and Salt; being thus open'd, is dissolved in Water, passing through the Veins of the Earth; and this

Its low Situation screens it from the chilling Blasts. A pretty Bowling Green might be made here, and little House for Shelter in Rain. The Sweet *Spaw* lies North of this, on the top of the Hill. As it has the Advantage of a finer and larger Prospect; so it's more exposed to Wind and Weather. The Ground about it is wet; the impregnating Minerals are weaker, and lie much deeper. The first rises

this Water thus impregnated, is boil'd to Vitriol. By imbrionated Sulphur we understand a superfluous Sulphur; which is not the Matter of the Metals, but only connate with them, and after the Perfection of the Metal, is in part cast off by Nature, and more fully by the Refiner's Fire. By *esurine* Sa't, we mean, a certain Acid Vapour, applicable to all Metals and Minerals, and connate with them in their *principiis solutis* and Embryo's, but especially with Iron and Copper. To illustrate the Nativity of Salts, let us attend to the Chymists Processes in preparing artificial Niter and Vitriol, viz. Salts arise from an acid subterraneous Spirit corroding the Veins of Iron or Copper; which being thus resolved or open'd, are by the Water that passes thro' them dissolved. The Causes of *Spaw* Water of Vitrioline Taste and Odour, are their Participation, either of corporeal or spiritual Parts of the Vitriol; the first being evaporated, leave a Vitriol at the bottom. A Spring of this Water he found two miles from *Knaresburgh*. Of these there are two sorts: For such as contain much Vitriol of either Copper, or Iron, or both, purge mostly, and sometimes vomit: their Operation being much like that of Steel, causing the first day a Nauseousness in the Stomach, purging all the while it's drunk; but its harshness prevents its passing the Vessels of the second Concoction. But such as contain little of the Substance, and much of the Spirit, pass the Stomach, Liver and other Vessels far sooner and easier than the Former. Such as contain only the spirituous Parts and Virtues (as that near *Knaresburgh*) are more effectual in curing Diseases, if not occasioned from obsti-

nate Humours, and confirmed Obstructions of the *Viscera*. These Waters cannot be carried far; but such as contain more of the corporeal Parts may.

Ch. 7. *Knaresburgh-Spaw* Well lies a Mile and half from the Town Westward, in a Moorish Boggy Ground: The Water has a Vitrioline Taste and Odour, much like the Ultramarine Spaws. The Spring rises directly up from the sandy bottom; just as Pipe-water, being obstructed, burst the Pipe, and forcing its self thro' the Earth's surface, rises like a Spring. For at this Well, the subterranean Veins are either terminated, obstructed, or too weak to contain the Water of the Spring passing forcibly through them: It makes a Vent where it can. Its Taste and Odour may be imputed partly to those Vapours that proceed from the Fermentation that is in Iron and Copper Mines; partly to the long continuance of the Water with the Iron or Copper Mine, whereby it receives their Odour, like Water standing long in an Iron or Copper Vessel; or its being actuated with some subterranean sulphureous Acidity, and in a speedy course corrodes Iron. On this Water he made the following Experiments: 1. Powder of Galls made it as red as well coloured Claret-Wine, when cold; but if heated, or boiled, Galls tinged it no more than common Water. He attempted to extract the Spirit alone from this Water in a Glass still; but was disappointed, as all others have been, and will be. 2. He filled with this Water two Phial-Glasses, containing equal Quantities; one he put in a Skillet of warm water, just to take off its Cold; the other he kept cold; then put Powder of Galls into both: Their red Tincture were the same.

rises up into a round Stone-Bason, which contains about twenty Pints of Water, rising up through a Hole in its Bottom. On the South, West and North Sides of it is a Wall of a Foot height, open above, being, most probably, the very Bason that Mr. *Stingsby* made for it. The Rivulet on its South-side being neglected, was filled with Sludge and Moss, and poured its Water into this Bason, whose Stream was also damm'd up below with Moss, Sludge and Oker. The Water also drained into this Receptacle from a great part of the Bogg above; so that it was a considerable time before I could get it opened to give Vent to the stagnant Water, which was up to the top of the

same. 3. He filled two Phials with fresh water; one he seal'd with Wax, the other he let stand open: After two days, he tried both with Powder of Galls; the uncork'd one was of a fainter colour than the other. He knows not how much of its Tincture it will lose by carrying far; but thinks it worth while to try: For as its Tincture decays, so do its strength and Spirits. 4. A Glas of this Water well waxed, when it had stood seven days, then pour'd out on Powder of Galls, gave a Tincture like small Beer. 5. This Water coagulates not Milk, like the *German Spaw*, and another Vitrioline Spring in the same Moor: The reason whereof is not from its want of, or lesser Acidity; For it has more of that than the Water of the dropping Well, which cruddles Milk boiled with it; but because its Acidity is not fix'd and permanent, but volatile, and quickly exhales. 6. This Water kills Worms, Frogs, and other such like small Animals, whether they creep, or are put in it. 7. The Water, when evaporated, leaves no Vitriol, only an insipid darkish Earth. The Scum on the surface of its stagnant water is also Earth, when dried. Our Author, with *Heer ab Heers*, say, that this Scum stands on all such Mineral Waters; and being dried, and thrown on the Fire, flames, and gives a sulphureous smell. 9. When Glasses filled with this Water, become turbid, and are cover'd with Mist, it's a certain sign of Rain ensuing. 10. This Water is

strongest of the Mineral Spirits in Frost, and in Summer it's stronger in the Morning than at Night or Noon, and weakest in Rainy weather: For in the first Case, the Frost binds up the Earth that the Spirits exhale not. In the second, the Coldness of the Night condenses the Air and Spirits; but the Sun's Heat rarefies them. In the last, the Water sinks into the Veins of the Springs; but trenching of it deep, (but not so deep, as to cut any of the Veins of the Spring) round the Well, would carry off both the Rain water, and drain the Boggs, which sink into the Veins of the Spring, and corrupt its Water. This would much improve the *Spaw*.

Ch. 8. Treats of the Virtues of this Well, and in what Cases or Constitutions it's profitable or hurtful. The Water cools and moistens actually, but dries and heats potentially; whereby the Diseases of the Body, which flow from an Excess of these Four Qualifications are temper'd and reduc'd. It also cuts, dissolves, attenuates, and absterges viscous tartarous Humours in the Stomach, Mystertery, Hippochonders, Reins, Bladder, &c. and expels them by Urine, being very diuretic, and consequently opens Obstructions of those Parts, which occasion most Distempers there. It penetrates the smallest Passages of the Body, where no other Medicine can come. It corroborates, astringes and relaxes; yet its Restriction occasions the Retention of nothing that should

the Wall above the Bason. The Oker in this Spaw is much deeper coloured, heavier, in larger quantity, and of a more ferruginous Taste, than that in the Sweet Spaw, which rises out of a Gravelly Moss, covered with Heath and Grass; under which is much Shale, with a Mixture of Iron-stone: For these communicate the impregnating Principles to this Chalybeate. It springs up into a Stone-Bason, containing about eighteen Pints, surrounded by a Stone-Wall four-square, covered with a pyramidal Roof, supported by four Pillars, each a Foot and half high, set on the Corners of the Wall, which is about two Foot high. On the top of this small Pyramid is a Stone Knob or Ball. The Situation is in a Rushy moist Ground: It's ditch'd round, both to drein the Earth, and prevent other

should be evacuated; and by Relaxation evacuates nothing that should be retain'd. It dries nothing, but what is too moist and flaccid; it heats nothing, but what's too cold, & *est contra*. Tho' no doubt, there are some Accidents and Objections to the contrary; yet they may be easily prevented or answer'd, so as they shall generally hold. It's therefore sovereign in the following Diseases; it allays all acid, gnawing and hot Humours, and cures all Symptoms proceeding therefrom; as, Agues, Consumptions, Quinsies, Tumors, Imposthumes, Ulcers, Wounds, &c. It stops Bleedings, Overflowing of Bile, Dysentery, and such like Fluxes. It strengthens the Brain, Nerves, &c. and prevents, or cures the Apoplexy, Epilepsy, Vertigo, inveterate Head-ach, Madness, and all such Symptoms, as proceed from the Weakness, Coldness, Heat, Dryness or Moisture thereof. It strengthens the Stomach, and causes good Digestion, consumes Crudities, which are the Causes of Obstructions. It makes the Lean fat, the Fat lean. It cures, and prevents Cholic and Worms. It strengthens and opens the Lungs, Liver, Spleen and Mysteriery. It cures difficulty of Breathing, Asthma, Dropsy, Melancholy, Hypo, Wind and Vapours. It cheers the Heart, cures Palpitations, Faintings and Passions thereof. It purifies the Blood, cures the Scurvy, Leprosy, Venereal Disease, Yellow

and Black Jaundice, and opens the Hæmorrhoids in many. It provokes Urine, and cures the sharpness and suppression of thereof; dissolves the superficial Parts of the Stone in the Bladder, and carries off the mucous Water wherewith it is mix'd. It expels Sand and small Stones quickly. It cures bloody Urine and a Gonorrhœa; cures all Ulcers, especially those of the Reins and Bladder. It cures the Gout, Aches, Cramps, Convulsions in any part of the Body, speedily. It opens all Obstructions, and suppresses all superfluous or excessive Uterine Evacuations; is a hearty Friend to the *Matrix*, cures Sterility, and prevents Abortion, heals all other Uterine Infirmities. But note, this Water cures not all these after the same manner; but some *per se*, as it passes along, either by its gross, or subtil Parts, or by Accident, when the Disease is by consent. Besides drinking, it's also used by Infusion, for Grievs of the *Uterus*; and by Injection, in Pains of the Bowels and Bladder, from sharp and hot Humours. It's also useful in Fomentations and Lotions, in Wounds, Ulcers, Itch or Scab. Drop into the Eyes, it wonderfully dries, cools and clears them. In a word, I have either seen it successful, or had satisfactory Evidence from sufficient Eye-witnesses, that it has either come up to, or outdone all Medicines, in opening Obstructions, evacuating superfluous morbid Humours,

other Springs getting in. The Enclosure within this square Ditch, is about fifty two Yards every way. At its East and lower End is a necessary House for the Drinkers to retire to. In the upper West Corner have formerly been Seats of Earth for the weak or weary to rest upon. It's a large half Mile South-East of the Sulphur-Wells, and a quarter of a Mile from the Village. This Well was not known till sixty Years after the other was discover'd. Its Oker is less, of a lighter colour, and not so stiptic as that of the other. The Bason, and House over it were built in 1656. This Water, by standing a Night in an Earthen Mug, became black, and threw up a strong blue

mours, and corroborating all the Parts of the Body, and seen it perform most of the foresaid Cures. Children of a Year old (if their Stomach can bear it) may drink moderately of it with success. The like may be said of old People, if it pall not their Appetite. Women with Child should not be too busy with it. But if there is necessity, they may use it sparingly for the 4th, 5th, and 6th Months, and all other times of Gravitation, very cautiously, and in small quantity, still swallowing some Restraining the Night before, to prevent Mischief. The blackness of the Drinkers Feces is neither from *atrabilis*, nor Iron only, but from the Vitriol forged in the Body, from the Acid Spirit thereof, dissolving the esurient Salt of the Iron, and corroding it into Coperas.

Ch. 8. Contains general Directions to be observed before, during, and after the Use of the Waters. First, it's necessary to purge before, that the Waters force not the gross Humours in the greater Vessels into lesser Tubes, and so generate greater Obstructions, and obstinate Diseases therefrom; as, Fevers, Dropsy, Gripes, &c. By this means also Nature being unburden'd of a Load of gross Humours, will be able to assist the Waters to come, digest, and evacuate the thinner that remain; and sooner recover its natural Strength and Health. But the Purges should be appropriated to the offending Humours, as well as adjusted to the Patient's Strength and Constitution;

and therefore mostly (no Symptoms forbidding) Vomiting, or a Dose of *Hiera Picra*, and some Lenitives after, to open the Passages of the Belly are necessary; or Bleeding, if the Person is full of Blood, or liable to Hæmorrhages. If the Obstructions are obstinate, he advises first to a Course of Chalybeates. And when they are come to the *Spaw*, give a gentle Vomit; next day, and the Morning after that, a gentle Laxative: Then begin to drink the Water cheerfully, with a Resolution to observe all necessary Rules prescribed. But the Poor, who cannot buy Physick, mostly begin three or four Mornings with the Sulphur-Well, which answers the same Design. But still, after all Directions, the Advice of a Physician acquainted with the Nature and Effects of Mineral Waters, and of these in particular, is first of all necessary. These things premised, let the Drinker begin with five or six half Pint Glasses of Water, and more, as his Stomach can bear; and so daily add two or three half Pints more, till it become oppressive and nauseous to him. Some can bear ten, others twenty, and not a few, thirty half Pint Glasses. But be sure you have had a Stool every Morning before you begin to drink: For the Excrements retained, hinder the Concoction of the Water, and its Passage thro' the Body. Hence Pressures, Fluctuations, Tensions, Gripings, and sometimes cold Sweats. It's also fit between every three or four Glasses of the Water, to use some Exercise, that they may

blue Scum. Both Chalybeates mix, or boil with Milk; but cruddle Soap, and raise no Lather, except the Water is taken up, and let stand thirty Hours in an open Vessel; then they are fit for common use, and will bear Soap. Both Springs made the Spirits in the Thermometer subside three eighths of an Inch below common Water. The *Tuewhet-Spaw* rises up East; the sweet *Spaw* South, or South-East; the Water of both is of a bluish clear Colour: The smell of the first is more Inky than that of the last. The Taste of the first is very rough, restraining, and Irony; so as the last tasted instantly after it, seems sweetish, nothing so harsh and rough. The first, when
the

may pass off sooner and easier: and to eat some stomachic candied Spices, as, Orange or Citron-peel, Angelica-root; but Elecampane candied is best of all; next is Carway, or Coriander-Comfits. Drink not the Water too fast, nor limit the Dose to too short a time. First of all, use a little Exercise; then drink three or four Glasses, walk half an hour, then drink again, and walk again; and last of all, use Exercise, till the Water is wholly gone out of the Body. But if any find a fourth part too much, let one eighth part suffice, and take a quarter of an hours Exercise: For if the Water is drunk too quickly, it causes *Nausea*, oppresses the natural Heat, compresses the Vessels and Passages, that the Water cannot get off so freely as it otherwise would; but occasions frightful Symptoms, as, swelling of the Belly, Prostration of Appetite, cold Sweats, &c. The time of drinking must be proportioned to the strength of the Disease, and Benefit received. In case any Person, after sundry Attempts to drink the Water, finds still a Return of those last Symptoms, he must presently forbear. If one finds the Waters produce no such Effect, but yet he is still the same, as to his Distemper, let him not despair, and give over, but continue a Month or two. In *Germany* they ordinarily drink them three or four Months together, and not seldom six or twelve Months, and at last are cured, when most despaired of. Therefore do many *Englishmen* miss of their Cure, by being too hasty, and allowing too short a

time (as a Month) in drinking the Waters, and if not cured then, conclude the Waters are not fit for them. It is also proper, every 8th or 10th day to take a Purge (both to carry off Crudities, and the gross Humours largely attenuated and dissolved) of *Hiera Picra*, &c. and the Lenitive Electuary the next day after it, to moisten the Bowels, and prepare the Passages. Some Cases require a daily Lenitive. Some People are averse to Physick, because they have seen it unsuccessful; but the Physicians attending might be ignorant of the nature of those Waters, or wanted to crack the Credit of the Spaw, or were afraid the Patient should get too soon well; or the Drinker might be backward in complying with necessary Rules.

Ch. 10. Contains special directions in particular Cases, &c. Such as have good Appetite and Digestion, may, four or five Hours after dinner drink half the quantity of Water they did in the Morning, provided they eat either no Supper, or a very light one. But such as have a weak and cold Stomach, must either wholly desist, or drink only one Glass for dilution. Such as drink it for Agues, should take care so to time it, that the Water shall be carried off before the Fit begin, that Nature be not perplexed in her Motions between Sweat and Urine. Such as have continual Fevers, must forbear it, till the Humours are fit for Evacuation by Sweat, or Urine. Let such as have a weak and cold Stomach, warm the Water. If the

the Bason is full, weighs sixteen Grains in a Pint lighter than common Water. But the Bason laded, and the fresh bubbling-up Water weighs thirty two Grains in a Pint lighter than common Water. The last was only four Grains in a Pint lighter than other Water; and the Bason laded, it was twelve Grains lighter than common Water. The first throws out about thirty Gallons of Water in an Hour, the last, sixty Gallons in an Hour.

136. The

Water be shut up, either in his Stomach, Bowels, or whole Habit; the first is plain from an Inclination to throw up. Here give *Hiera Picra*, or Rhubarb. If in the Belly, it causes a Rumbling, Wind, Tension, and Oppression: Here use Glysters. If in the Habit, there is Chilneis, Swellings and Oppression: Hydragogues will carry it off. Such as drink, but are too feeble to use Exercise, and therefore retain the Water, may either drink all, or part of it in Bed: For it often works better in Bed than up, the Heat thereof taking off the Contraction from the Water; and either relaxing the Parts, or facilitating their Relaxation. To render the Use of the Water more effectual, Medicines suitable to the Distemper may be used; as in the Stone, a Spoonful or two of Saxifrage-Juice given in the first Glass, or Turpentine-Pills, or a Bolus of Turpentine and Cassia over Night: And in very great Obstructions, or Dropsy, Steel-wine with the first Glass, and drink no more of an Hour after. To make the Water go more quickly off, the first Glass may be mixt with Syrup of the five Opening Roots, or Syrup of Liquorice, or *Sal Nitri*, or Spirit of Salt, or Salt of Tartar; or mix the Water with a Glass of White or Rhenish Wine, or two or three Glasses first every day of the Sulphur-Well, or a Decoction of Fennel, or Parsley-Roots before you begin the Water; all these being penetrative and opening of the Passages. But where any of these Mixtures are necessary, they should never be used without the Advice of a Physician, who is a Judge of the Waters, and the different Constitutions and Dis-

seases of human Bodies. Should the Water fly to the Head, and in a manner inebriate the Drinker, let him take Powder of Nutmeg and Coriander in every four h Glass of Water. *Quest.* Whether will drinking this water cure Pimples and red Flushings in the Face? *Ans.* The drinking often makes them worse; yet they may, with Caution, be cured by it thus: Let the Patient drink ten or twelve Mornings together of the water: Then let him be purged with cooling Lenitives; then for a week after, drink clarified Whey, made with cooling Herbs and Roots; then let Blood; so return another Fortnight to the use of the water; then take to the Purges and clarified Whey again for a Month, not neglecting in the mean time the Application of Topicks to the Place, as Oil of Eggs, Oil of Tartar, Juice of Lemons and Salt, white Ointment; but, above all, Brimstone dissolved in Oil. By these, and the Waters, the most pimpled Face in the world may be cured.

Ch. 11. Treats of the Necessity and Effects of Exercise. Whilst the water is in the Body, it excites warmth, accelerates Circulation and Evacuation, promotes Digestion, and, if the Patient has strength, should be continued, from drinking the first Glass, till the whole dose is drunk, and discharged. Riding on Horseback, or in a Coach, are the best Exercise. But, in defect of these, walking, bowling, or pitching the Bar are next: Yet let not Sweat be provoked on any terms. Weak People may drink them warm in Bed, but not sleep after. The drinker should neither sit on the Ground, stand

136 The Sweet Spaw, and Allum-Well compared; the first, with Solution of Gold was yellow through the Glass, but a deep Green, to look above it. The last was a very light Yellow. With Solution of Silver, both were of a bluish white Colour. With Solution of Copper, both were of a clear light Blue. With Tincture of Rhubarb, the first was of a Chocolate-Colour, the last, a greenish Yellow. With Sublimate Mercury, the first was whitish blue, with a Scum, the last a bluish Clear. With Sugar of Lead, both were of a clear Pearl-Colour. With Oil of Tartar, both were a bluish Clear. With Spirits of Vitriol, Salt, and *Sal Armoniac*, they were a clear bluish Colour, and made some Ebullition with the first two. With Syrup of Violets, they were a whitish Blue. With Tincture of Fustic,

stand in the Sun, nor walk late in the Evening.

Ch. 12. As to the Season for drinking, the fittest time is from *May* to *September*. For tho' the Water is strongest in Frost, yet it's an improper Season for sick People to travel; and the Continuance of Frost is uncertain. The Morning between six and seven a-Clock (except to weak People, whose early rising may create a Nauseousness, and prevent the Digestion of Crudities in the Body) is the best time of the day. In extreme wet weather, the Water is much weaker than at other times; therefore should not be drunk without Sugar of Iron, or Spirit of Vitriol.

Ch. 13. As to the Diet to be observ'd, Intemperance prevents many of the expected Benefits; and the Water exciting a strong Appetite, many People are apt to gormandize; let all salted Flesh be refrained, and Fat, Bacon, Pork, Neats-foot, Tripes, tame Ducks, Geese, Gizzards, Eels, Salt Fish, and all the Product, and Preparations of Milk, except Butter, Whey and Milk; and also Leeks, Onions, Parsneps, Cabbage, Musk-Melons, and Cucumbers; all Variety of Meats, and all Meats dressed with delicious Sauces, which both force an unnatural, and prolong the natural Appetite, beyond its true desires. But no kind of Food should be eaten, till the Urine turns from a

clear to a higher colour: For then most of the Water is gone off. And for Drink, use Ale or Beer, neither too new, old, strong nor small. Let Supper be got six Hours after Dinner, and sup more freely than dine.

Ch. 14. The Sulphur Well, so called from its sulphureous smell, with which it has a salt and bitter Taste. The Salt remaining after the Evaporation of this Water, is of the same nature, and indistinguishable from common black Sea-Salt. Now the saltness of the Sea is neither, first, from the Sun's exhaling its sweeter Parts, as *Aristotle* imagined; nor from the Sun's boiling into the Sea, by the Vehemence of its Heat, that saline Taste, as *Pliny* fancies; nor 3. is it from the Rain, mixt with hot, dry, and terrene Exhalations, as *Scaliger* supposes: But it is from the continually burning *Bitumen*, together with the Terreneness therewith mixed in the Gulphs of the Sea. The same is the reason of the saltness of our Well, as also of its Bitterness. Its stink is deducible from the same. The Experiments made on this water were these: It tinges Silver, 1. yellow, then black; but discolours not Gold. 2. When boiled, it loses its tinging Property and stinking Smell. 3. It coagulates Milk. 4. Its distilled water loses its smell and coagulates not Milk. 5. The boiled water coagulates Milk, tho' it has lost its smell.

Fustic, both were of a bright Yellow. With Tincture of Brazil-wood, both of a finer redish Purple. With Tincture of Logwood, both a deep Blue. With Tincture of Galls, the first was a dark Red, the last a dark Purple. With Tincture of Green Tea, the first was a fine Crimson, the last a dark blackish Yellow. With Tincture of Red Roses, the first was a purplish Black, the last a dark Black,

smell. 6. Seven Gallons of it evaporated, left a Pound of Salt, black at first; but by repeated Filtrations and Exhalations, became very white. 7. This Salt coagulates Milk. 8. The Water presently kills Worms, or other Insects put in it. 9. He filled two Phials with this Water in moist weather; corked the one, but not the other; within two hours the Water in the first became white and thick, and in three days let fall a white Sediment, and the Glass-sides were furred: The Water in the other Glass had not those Changes. In fair weather, he repeated this Experiment; the water in neither of them alter'd much; only a small thinnish white Matter fell to the bottom in three days time. The Waters continu'd clear, and the open Bottle lost its smell. 11. A Pint of this Water was two Scruples heavier than common Water. Its tinging Property is not from a bodily Sulphur, but from the Vapours, or fine *Effluvia* thereof mix'd with the Water. Its coagulating Property is from the Acidity of its Salt, tho' not discoverable by Taste. From this Salt is extracted a very good Spirit. 240 Yards above this *Spaw* is a Bogg of twenty yards diameter, out of which he digg'd a Mineral Substance, like Iron-Cinders, but almost rotten, being corroded by some acid Spirits, whereof the Bogg is full. This Mineral Substance, cast into the Fire, burns blue, and smells like Sulphur: It tastes like Vitriol, and Vitriol may be got out of it; nay, in time, it is almost wholly dissolvable into Vitriol: For wash it, and set it three days in a Cellar, and it is wholly cover'd with a white sweetish Vitriol, which dissolved in Water, and the Mineral set in the Cel-

lar again, was cover'd as before. He repeated this, till it almost turn'd to Vitriol. In the same Bogg he found three or four sorts of Waters, viz. two Sulphurine, and two Vitriolic; but discovering them only the last Day of his stay there, he had no time for new Experiments; only the Mineral Substance he tried at home. He thinks, if the Bogg were drained, and new Wells built there, it might not only be of public use, but perhaps new kinds of Water, and better might be discovered. The smell of this Sulphur-Well is perceived a good way off, in moist and cold weather.

Ch. 15. As to the Virtues and Uses of these Sulphur Wells, they may be us'd either inwardly or outwardly. If drank, it attenuates, absterges and resolves viscous thick Humours, and irritates all the Vessels of the whole Body, to expel all the offensive Humours. It opens and removes those strong and obstinate Obstructions either in Men or Women, that would yield to no other Medicines whatever. It often evacuates by Stool great Lumps of viscous slimy Matter, which, no doubt, whilst in the Body, was the occasion of sundry Distempers, and which could scarcely be removed any other way. It heats, and quickens the Stomach, Bowels, Liver, Spleen, Blood, Veins, Nerves, and indeed the whole Body: So that it consumes Crudities, rectifies all cold Disorders in all parts of the Body, begets good Appetite and Digestion, cures the Dropsy, Spleen, Scurvy, Green-sickness, Gout, Cramp, Epilepsy, Head-ach, Kings-Evil, and all Symptoms and Diseases arising either from Crudities, cold, viscous, slimy, or corrupt Humours, which obstruct and distemper the Stomach, Bowels,

Black, with a purplish Cast. With Tincture of *Sumach*, both were a charming Purple. Six Inches under the Bason of this Allum-Well in the Bogg, lies the impregnating Mineral.

There is another Chalybeate Spring, in the Mid-way between *Knaresburgh* and *Harrigate*, on the South side of the Brook, with a Bason, and a little square Place built over it. With Solution of Gold,

els; Mysentery, Liver, Veins, Brain and Nerves, and those tho' of long Continuance. It infallibly kills Worms. A Course of this Water must be begun by degrees, and not the full proportion taken at once, but at several times, with intermediate Exercise. The Quantity drunk, must be proportioned to the Constitution and Strength of the Party, and his bearing it; also the Humour offending, the Predominancy of the Disease, and the Aptness of the Body to be wrought upon. Cold, dull Bodies can bear more than others: But, in general, let the Quantity be such as may move the Belly five, six or seven times, as the Body can bear. This Water often works too quickly upon several Bodies; therefore such should first drink two or three Glasses of the Sweet *Spaw*, to retard the too speedy Operation of the Sulphur-water, and keep it longer in the Body, that it may more successfully perform its Operation. It will also be proper, after he has drunk his full dose, and it is almost wrought off, to drink four or six Glasses of the *Spaw* water, especially in Choleric Bodies. They that nauseate it on account of its smell, but want its Effects much, may boil it a little, till it has lost its smell, then drink it: For altho' it has then lost some of its Virtues, yet the greatest residing in the Salt and subtil Acidity, remain. Or, drink its Salt in the *Spaw*-water, it will answer, as he often tried. Its Salt dissolved in Spring-water, and drunk, produces good Effects. The Spirit of this Salt is excellent, a few Drops of it being put into every Glass of the *Spaw*-water; for it makes it more penetrative and effectual against several Distempers, as, Dropsy,

Gravel, Stone, Suppression of Urine, &c. Such as have Inflammations, Excoriations, Ulcers in the Bowels, Kidnies or Bladder, or a sharpness of Urine, should not use this Water inwardly; for it increases these Disorders. The general Rules for *Spaw*-drinkers are the same here; only less Exercise will suit this, and indulge a better Diet. This Water outwardly, dissolves hard swellings, cures old Ulcers, Scab, Itch, Scurf, Leprosy, and such other diseases of the Skin: For by bathing in it, the affected Parts are dried, corrupt Humours consumed, Putrefaction prevented, &c. Bathing in it warm, consumes all moist Distempers, whether hot or cold; as, Dropsy, Gout, hard Tumours, Swellings of the Legs, Leprosy, and the like. It makes fat People lean, reduces them to a natural, dry, firm, healthy Habit of Body; but it must be used cautiously. He thinks, if the Conveniencies for Bathing were as good, the Waters would be every whit as effectual as those in *Somersetshire*. The Spirit of the Salt rubbed into any swell'd or pained Part, cures it presently. As the Waters are used outwardly for cleansing and healing; so there is a kind of slimy bituminous Mud below the Sulphur-Wells, which burns like Sulphur, and is of great use in softening, digesting and resolving hard Tumours, and for strengthening weak and infirm Parts, and allaying Pains and Aches in the Limbs, be they of whatsoever nature, being outwardly applied. He saw a Youth come there, who had a Horn on the top of each Finger, and his Face and Wrists covered with a horny substance; who by the inward and outward use of this Well, had all his Horns loosen'd, and fall off in a little

Gold, this was a fine greenish Yellow; with Solution of Silver, a dark bluish White; with Tincture of Rhubarb, a greenish Yellow; with Solution of Sublimate, clear; with Solution of Sugar of Lead, whitish Clear. The acid Spirits changed not its Colour. With Oil of Tartar, very clear; with Syrup of Violets, a clear Sky-blue; with Tincture of *Brazil*, a reddish Purple; with Tincture of Logwood, a dark Inky Purple; with Tincture of Galls, a dark bluish; with Green Tea, a dark Purple; with *Sumach*, a transparent dark Purple. I took two Wine-Glasses of the same sort of Figure and

little time; which should recommend this Water as much to Cuckolds, as the *Levitical* bitter Water was once to good honest barren Matrons.

Ch. 16. The petrifying Well, opposite to *Knaresburg*-Castle, on the West side of the River *Nid*, springs up in a high Ground; which running a little way in one Stream, is, at the Brow of a Descent, by a Damm of ragged Rocks, divided into several wickling Branches, whereof some drop, and some stream down, partly over, and partly through, a jetting Rock. This Spring is of a petrifying nature, the Rock from which it distils, being wholly produced of it, and daily increases; tho' Pieces of it are daily cut, or broke off. This Water generates Stones, wherever it falls or runs, tho' not the whole Course; but only near the Place where it fell. If Sticks, or Pieces of Wood lie some Weeks in it, they are cover'd with a strong whitish Crust, the Wood in the inside continuing of the same nature as before; but spongy Substances as, Moss, Leaves of Trees, &c. which the Water penetrates, become perfectly stony and hard. The Cause of this petrifying Quality, is a stony Matter which is in its *Principiis solutis*: For indeed, the Beginning of all Bodies, whether Vegetable, Animal, or Mineral, is in a liquid Form, and concrete by degrees. On this Water he made these Experiments: 1. He evaporated the Water, and in the bottom remained a stony Powder, like the Powder of the Stones of the Rock.

2. A Pint of it weighs ten Grains heavier than a Pint of common Water. 3. It coagulates boiling Milk, from the sulphureous Acidity of the Mineral in the Water. Its chief Virtues are, to allay acid, gnawing and hot cholerick Humours, and to stop all Fluxes proceeding from thence. It's also good in consolidating and cicatrizing of Ruptures, bloody Urine, excessive flowing of the *Menses*, and for weak Backs. Such as drink this Water, and have neither *Diarrhea* nor *Dysentery*, should have a Lenitive Glyster injected every other Day, or take a Lenitive of *Cassia*, Manna, &c. every other Night. This Water, in many Cases, is better than Syrup of Coral; and the Powder of the Rock, or rather of the Water evaporated, may be used instead of prepared Coral. The quantity of Water to be drunk in a day, is, from half a Pint, to half a Gallon, according to Age, Constitution, Disease, and Place affected: Dose of the Powder, from ten Grains, to a Dram.

Ch. 17. Of *St. Mungo's Well*. He knows not, whether the Well was Sainted from its real or imaginary Virtues. *Dr. Dean* allows it no other Virtues, than those of common Water. Whence, it seems, he was no Papist, or he has forfeited this Saint's Favours: For the *Dr.* found no sensible Minerals in it; but they often have, tho' not perceived: For it may contain *Effluvia* of Lead or Tin, which make it both colder, and give it a kind of fermenting Nature, so as it stirs up a Heat in the Habit of the Body: For

and Size. I put six Drops of Tincture of Galls in each Glass, and fill'd them up with Water. That with the *Tuewhet-Spaw* was of a deep Violet-Purple; that with the *Sweet Spaw*, was of a light red Purple: Both became deeper, by standing all Night; but the first still kept its Advantage: Nor did six Drops apiece more of this Tincture turn them black, when fresh taken up. Two Phial-Glasses containing half a Pint apiece, being filled about two thirds full of Water, corked alike close, and set in a Pan in six Pints of the *Tuewhet-Well* Water cold, and set over the Fire, till it was between Milk-warm and scalding-hot: Then nine Drops of Tincture of Galls put into each of the above Wine-Glasses, and filled up with the hot Water out of the Phials that were in the Pan; the Water of both was near the same with that of the *Sweet Spaw*. The same Phials, with their Water, corked up again, and set in the Pan till the Water boiled; then each poured out into its former Glass on twelve Drops apiece of Tincture of Galls, neither of them struck Purple, except you held the Glasses down, and look'd on their Surface; then you might perceive a small shade. I took a Wine-Glass full of each Water new taken up, put twelve Drops of Tincture of Galls into each; then instantly precipitated the Vitriolic Principle. The *Sweet Spaw* took double the quantity of the Precipitator to cruddle it, and yet the *Tuewhet-Spaw* had double the quantity of Vitriol of the other. The *Tuewhet* and *Sweet Spaws*, brought home to the *Queen's Head*, in two large, open Oak-Vessels, and let stand one Hour; the first weigh'd

if a Man bathe or wash in it a quarter of an hour, when he comes out, he will presently be very hot, and continue so a long time, even in a cold Air, and without his Cloaths. Nay, upon tender Women, who dare not go into other Water, they sweat toward Morning, if they lie in their wet Linen all Night, whereby they are often cured of old Aches in any part of their Body, and of swellings, hard Tumors and Agues, and of many other outward Distempers, whether from cold or hot Humours. Such as have tender Heads, and cannot do without many Cloaths upon them, or are liable to frequent severe Colds, three or four Mornings washing their Head in this Water cures them. However, I would have none to use it rashly, without the Advice of a Physician. The Well is built four-square, and

has a House by it, to dress or undress in. The Spring rises higher in May, and falls about September. He ascribes these Virtues to it, neither out of Contradiction to Dr. Dean, nor from Affection to Popery; for he declares himself no Papist: But because he saw some notable Cure done by it; and the Dr. owns great Feats done by it formerly. Suppose these the Effects of Faith; yet if People were cured, the Means are lawful: Let them still retain a strong Imagination, and reap Benefit by it. *Finis.*

Dr. Simpson, in his *Hydrologie Chymica*, p. 136, to 147, gives an Account of the *Knaresburgh Spaws*, just seventeen Years after Dr. French, as he was twenty Years after Dr. Stanhope, and he six Years after Dr. Dean, and he thirty six Years after

weighed twenty eight Grains in a Pint heavier than at the Spring; the last, fourteen Grains in a Pint. Both of them bubbled and sparkled more at the Spring, when poured out into a Glass, than they did at home, especially after three or four Hours standing. I took out of a Pan over the Fire, a Glass of the Sweet Spaw, when the Water was scalding-hot, put a little Gall to it, which gave it a very faint Tincture, and that faded afterwards. But the Tuenhet-Spaw, used the same way, gave not the least Tincture. I put half a Grain of scrap'd Gall into a Glass of the fresh Water, when it had stood an Hour in open Oak Vessels. Both Spaws were first of a light Red, then deeper; but neither became of a true deep Claret-colour, far less, Ink-black. I put six Pints of the Spaw in a Pan, set it on the Fire, with a Phial half full of the same Water, and close corked; let the Water stand, till it was scalding-hot; then took two Wine Glasses, put nine Drops of Tincture of Galls into each; put some of the hot Water out of the Pan into one, and some out of the Phial into the other; the last had lost very little of its tincturing Property; but the first gave no Tincture, more than common Water. I instantly corked the Phial again, and set it in the Pan, till it boiled

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Dr. Hunton, and he after Dr. Bright, who was nineteen Years after Mr. Slingsby's Discovery, Use, and Recommendation of it.

We design to be but brief on this Sweet Spaw, Dr. French has wrote so fully on it lately. This Water has but a small Portion of esurine Acidity; which having preyed a little upon the Minera of Iron; for Powder of Galls put in the Sweet Spaw, turned its Water purple, and in conclusion, Inky; but Oil of Vitriol clear'd it again, and Oil of Tartar muddied it again; but still Oil of Vitriol or *Aqua fortis* clear'd it. Drop Oil of Tartar in some of the fresh Water, it gives a white Milky Separation; which, with Oil of Vitriol, after Ebullition, becomes clear again: But any of the Alkaline Salts turn it white, and restore the Coagulum; but yet may be made clear, by Addition of the acid Spirits. All which demonstrate, that Vitrioline Solutions undergo the same Alterations by the Effusions of sundry Liquors, as Alumi-

nous Solutions will do; and that they are, in effect, but the same Mineral Esurine Salt, under various disguises, from Mineral Beds, where they become specified into this, or the other Salt, from their touching upon different Mineral Glebes. So as, in effect, all Mineral Springs, whether Vitrioline or Aluminous, are the same; only some Waters are more strongly saturated with Minerals than others; as, *Scarburgh* and *Milton* are richer in Minerals than this. The Air here is much preferable to that of *Scarburgh*, especially for weak and tender Bodies; and the choice of Air is one great Article in the Cure of Chronic Diseases. That this Spaw is Vitriol, he proves it thus: dissolve a Dram of Salt of Steel in a Pint of Spring-water; put two or three Spoonfuls in a Glass of common Water, and it has the exact taste of this Spaw: Therefore should its drinkers frequently mix Salt of Steel with the Water, that it may be more efficacious in less quantity, in shorter time, and so prevent

two Minutes ; then try'd it a second time with Galls. On the first mixing, one might plainly see, it had been a Chalybeate ; but in two Minutes the shade was wholly gone. The *Tuewhet-Spaw* tried in the same manner, gave no shade at all. Both times the Corks were taken out of those Phials, they gave a loud Crack ; but that with the *Tuewhet-Spaw* had almost thrown out its Cork ; and when pull'd out, it made a noise almost like a Pocket-Pistol. When the Water of those two Springs had stood sixteen hours in open Vessels, I try'd both again with Tincture of Galls ; the *Tuewhet-Spaw* had intirely lost its Vitriol ; the Sweet *Spaw* still gave a faint purple Shade. A Quart Bottle of each of those Waters, being well corked, and set in a Pan of Water over the Fire till it was near boiling, then taken out, uncork'd, and some of the water pour'd on Tincture of Galls, that in the top of the Bottle struck Purple ; but neither that in the middle, nor bottom. A Phial of this Water well corked, and inverted all the while in the water, till it boiled a little, then taken out, and tried with Galls, it did not strike Purple. Another Phial filled half full, well corked, and inverted in the same manner, till the water was scalding hot, the Water equally struck Purple with Galls. *Tuewhet-Spaw* and Sweet *Spaw* fresh taken up, had equal number of Drops

vent several Inconveniencies which often happen from swilling down large Doses. Besides, the *Crocus* of the Steel in that Vitriol, when taken into the Stomach, would precipitate ; upon which, the excrementitious Salt, or Tartarous Recrement, that great Obstrueter in many Diseases, would be coagulated, and by the Peristaltic Motion of the Intestines, would be carried off in black Stools. It's from the great quantity of weak Mineral Waters drunk, that the Fibres and Membranes are often stretched, weaken'd and relax'd. Hence Cathexies, Drop-sies, Deffluxions, Rheums, &c. ensue, which the Salt of Steel taken in their Water might prevent : For it astringes, and preserves the Tone of the Bowels and Vessels. He advises the drinkers, before they begin, to take a Vomit or two of Salt of Vitriol, which would loosen and carry off upwards and downwards the viscous tartarous Recrements impacted in the Coat of the Stomach, which

the Water might slip over a long while. Specificks judiciously chosen, according to the Distemper, added to this Water, may assist in curing sundry Diseases. But the largest Dose of the Water, sharpened with Salt of Steel, should be drunk in the Morning, with Exercise ; and only strong exercising Persons should be indulged an Afternoon-dose of the Water.

As to the Sulphur-Well, its saltish Taste and its much black Salt left upon Distillation or Exhalation, sufficiently prove it to have a strong Body of Marine Salt in it : For this Salt, by sundry Solutions, Filtrations and Evaporations, becomes the same Sea-Salt as we use at Table. Bay-salt thrice calcined, dissolved in Water, gives exactly the Odour of the Sulphur-well. Hence he concludes, 1. That Sea salt is not a simple Salt, but a Mineral Concrete, having an embryonated (*i. e.* the first Appearance, beginning, or only volatile, not yet a real or fixed)

Drops of Tincture of Galls dropt into the same quantity of each, the first was a much deeper Purple than the last: The first was also whiter with Spirit of Hartshorn, than the last. I had occasion to see both these Waters about an Hour before Thunder and Rain, Apr. 6. but could discover no Mist on their surface, either in their Basin, Stream, Vessels or Glasses. They both kill'd Worms, and other small Insects, by lying in them a few hours. Fifteen Pints of the *Tuewhet-Spaw* exhaled, left twenty six Grains of sediment; thirty two Pints of the *Sweet-Spaw* exhaled, left eighty Grains of sediment. But in *October*, ten Gallons of the *Tuewhet-Spaw* exhaled, left nine Scruples fifteen Grains of sediment; six Scruples whereof was Earth, and seventeen Grains of the first Exhalation was Earth also. The eighty Grains of sediment from the *Sweet Spaw* dissolved and filtred, left two Scruples and four Grains of Earth. A little of the *Lixivium* of the *Tuewhet-Spaw* mix'd with half a Pint of distilled Water, with Solution of Silver, was purple, and had a very small sediment. With Sublimate, it had much woolly sediment; with Oil of Tartar and Spirit of Hartshorn, was brownish, and had a small sediment; with Syrup of Violets, a faint Green; with Tincture of Logwood, a deep opaque bluish Green; with Galls, muddy, and a brown

fixed) Sulphur, close lock'd up in the *Compages* of its Body; whereby the *primum Ens Salium* becomes shut up in it, as well as in other Mineral Salts; and therefore cannot be taken away, except the hydropic Moisture wherewith it abounds, be exhausted by Flagration or Decrepitation, and the Earthy Eculency, or ferid Sulphur be removed by reiterated Calcination or Fusion by Fire. For all Mineral Salts are but the several specified Concretions of that *primum Ens Salium*. 2. The constitutive Principle of sulphureous Springs, is a *Sal marine*, so digested in the Bowels of the Earth, as that its Mineral embrionated Sulphur becomes unloosed, which together dissolving in the Vein of a Spring, passing thro' the various strainers of the Earth. That an embrionated Sulphur predominates in sulphureous Springs, appears by exhaling the Water: For before half is consumed, the smell is gone. The same is the Case with the filtred Solution of Bay-Salt. 3. He concludes, that such a Solution of Bay-salt, with its embriona-

ted Sulphur in a subulous Spring, may be nearer the *primum Ens Salium*, than a coagulated Salt, and is fitter for the *Sal circulatorium*. 4. That Spirits, or the *primum Ens Salium*, before they are coagulated upon Minerals or other Bodies, are but in Embryo, or Infancy; therefore coagulate upon Bodies, to the impairing their own Activity, and so require a Resolution from their Coagulation, by working themselves up in Textures of Bodies, and so require a Resolution from their Coagulation, before they can be brought to that simplicity they were in when they found Bodies to dwell in. This Sulphur-Well is of little more medicinal Efficacy than so much Trencher-Salt, dissolved in the like quantity of common Water; only the Sulphur doth somewhat provoke Nature, stimulating the expulsive Faculty of the Stomach, to discharge either upward or downward. The Plenty of its Salt preserves against Putrefaction, and Diseases thence proceeding, as, Worms. But its

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brown sediment. This Salt set to chrySTALLIZE, projected chiefly Chrystals of Nitre. Three quarts of the Sweet Spaw exhaled, left only six Grains of sediment in October; which scarce changed colour with Syrup of Violets; fermented with Oil of Vitriol, but not with its Spirits; emitted no urinous smell, mix'd with *Sal Armoniac*; laid on a hot Iron, it neither swell'd, bubbld, crackld, nor melted. Two quarts of the Allum-Well exhaled, left four Grains of a very dark brown sediment. Rack-Salt, fermented strongly with Oil of Vitriol, but not with its Spirit, neither crackled, melted, nor boild on a red-hot Iron; turned green with Syrup of Violets, but alter'd not Sublimate's Solution, nor was purple with Tincture of Galls; emitted no urinous smell with *Sal Armoniac*. Three quarts of *Knaresburgh* Chalybeate exhal'd, left only six Grains of sediment, very black and salt. It fermented with Oil of Vitriol, but not with its Spirit; reviv'd, and made exceeding pungent the dead Spirit of Hartshorn; crackled, and flew on a red-hot Iron; altered not Solution of Sublimate, nor Tincture of Galls. Thus we find the Sediments of the *Tuewhet*-Spaw and Sweet Spaw are near as 1 to 3072. The Sediments of the Allum-Well and *Knaresburgh*-Chalybeate are near as 1 to 7680. But the Salt is little more than a third of the two first Sediments.

138. From

extracted blackish Salt hath no more Virtue than common Salt; and tho' there is a Vitrioline Stone 120 Yards distant from it, yet partakes it not in the least thereof, either in Taste or Virtue.

In his Hydropical Essays, publish'd in 1676, we have a Supplement to the Sweet Spaw, from p. 76, to 82; wherein he says, he is sure, whatever others say to the contrary, that it hath imbibed but a small quantity from the *Minera* of Iron; first, because upon Exhalation, it leaves an insipid dark-colour'd Earth, arguing, that the Vitrioline Marcasite the Water washes, is lean of Vitriol; therefore it coagulates not Milk like the *German Spaw*. 2. From the great quantity of Water to be drank, before it operates by Stool or Urine. 3. From the Mineral Springs passing thro' some Vitrioline Marcasite found in Coal Ground. 4. Because all these languid Vitrioline Waters, on being long expos'd to the Air, or carried, they precipitate a little yellow Sediment, and

become effete in their Virtues, and are like common Water, their supposed Spirit being only imaginary, and a mere *Chimera*, existent only in the Brains of their Conceivers, &c. Then proceeds to some Corollaries on an Experiment on an Infusion of a Vitrioline Marcasite striking Purple with Galls.

Dr. Lister, p. 32, *Exercit. prior distis*, *Medical. Angliae*, says, that *Harrigate* Sweet Spaw has the same Lime-stone-Salt, but very few Grains in a great many Pounds. For out of eighty Pints of it he produced only ninety Grains of Sediment.

Thus, I have given here a full Extract of all the Pieces that have been publish'd on these Waters, both Sulphur and Chalybeate, that I might not mangle and disfigure them, by retailing them into Parcels on the different Waters: For some of them are very scarce and rare; therefore such as have them not, have here their whole Substance, and need not trouble themselves for the Treatises.

138. From what we have said on these Chalybeates, we shall briefly draw the following Inferences.

1. Since the *Tuewhet Spaw* weighs so much lighter at the Spring-head, sits easier upon the Drinker's Stomach, goes sooner off the Body, sparkles more on pouring out into Glafs, than the sweet Spaw, we say, the first is much richer of the Mineral Spirit than the last.

2. Since the first lies lower, rises more immediately from its Minerals, affords more Oker, and that of a deeper brown Colour, heavier, more stiptic to the Taste, and the Spring throws out much less Water in any given time, and that of a more restraining Irony Taste and Inky Smell, gives a deeper Purple, and affords a larger Precipitation with Galls, by the help of a less Precipitator than the other; we say, the first is richer and stronger of the Chalybeate Principle than the last.

3. As the first is richer of the Mineral Spirit, goes sooner and more easily off the Stomach and Body, and is more quick in its Operation; so it's a more penetrative, incisive, attenuating, and powerful Deobstruent than the last.

4. As it contains much more Oker, and that richer of the Metal, and rougher and harsher to the Taste, it's therefore a greater Astringent and Vulnerary than the last.

5. Since this Water, when fresh, cruddles Soap, tastes rough, harsh and Irony, and is of great medicinal Efficacy; but when it's taken up, and expos'd thirty six or forty Hours to the open Air, or carry'd to some considerable distance, it loses its Taste and medicinal Virtues, and ceases to cruddle Soap: We say, these were the Effects of some Salt, tho' neither the Esurine, nor the *Acidum vagum*, which we know not what it is, nor what Idea to form of it, having never come under our Senses nor Examination, but really imaginary.

6. But those Waters, when fresh, striking Purple with Galls, Oak-Leaves, Green Tea, *Sumach*, Red Roses, &c. and bluish with Tincture of Logwood, which are the Characters of, and only compatible with Vitriol; we say, this Salt is Vitriol only.

7. But since, upon long standing, whether expos'd to the Air, or not, or on long Carriage, they lose both their Taste, Clearness, and tincturing Property, and cruddle Soap no more; we say, this Vitriol is wholly Volatile.

8. Since a third of each of a Phial-Glass of each of those Waters warmed, struck alike Purple with Galls; but neither struck Purple when the Water came to boil: And since the first is sooner effete
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by standing or Carriage than the last; its plain the Vitriol of the first, as it's more in quantity, so it's more volatile than that in the other.

9. Since the proportion of sediment in these Waters is only to the Vehicle, as 1 to 3072, and the proportion of fixt Salt to the Body of Water is scarce as 1 to 9000; then we say, these fixt Parts have a very inconsiderable part, or rather no share in the Cures done by them.

10. But since these Waters, when kept till they have lost their volatile parts, load the Stomach, occasion Flatulencies and Indigestion, and go off the Body more slowly than common Water, and finally, rather beget, than cure Diseases; we say, their whole medicinal Effects lie in their volatile parts, and in them only.

11. These Waters, upon Exhalation, have a sediment, which we call their *Fixt Parts*; part whereof is dissolvable in Water, and part not; the first we call *Salt*, which is mostly Nitre; the last is Earth, and chiefly Oker.

12. Since the Water lathers with Soap, after it's kept, tho' we find it retains its Nitrous Salt; then, not this Salt, but its Vitriol, was the cause of the Soaps crudling before.

13. Since the Allum-Well produces the same *Phænomena* with the Chalybeates; and since we find it streined through Vitrioline and Sulphureous Concretions, brought up thereby, and generated out of the Water; we say, this Well is also Vitrioline, and the contrary is an Error.

14. Since these Concretions have been dissolved in, and mixed with Water, before it came to the Day, and that they contain as much if not more Sulphur than Vitriol, as is evident from the vast quantity of yellow Brimstone they afford on keeping, and from their Flame in the Fire, and Smell when fresh; we say, these Chalybeate-Springs are impregnated with Sulphur, as well as Vitriol; both which are the Product of the Iron-stone, or Marcasites.

15. Since the upper part of the warmed Water in the Phial struck Purple with Galls, &c. but not its middle, or lower part, we see, the Spirit rises first from the bottom, and ascends to the surface of the Water, by Heat or standing, before it leaves its hold wholly; and therefore, after long keeping, only the upper part of bottled Chalybeate Waters is medicinal, the rest being no more, and scarce so good, as common Water.

16. Since the Phial-Glass inverted in the Pan of Water till it boiled, then taken out, and poured on Tincture of Galls, tinctured
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not, we see it's a vain and idle Attempt, to seek to procure a Spirit from Mineral Waters by Distillation, as some at *Scarburgh* last Summer imagin'd they could; but upon Trial, found themselves disappointed, for all their Cunning, as I had told them before.

17. Since the inverted Phials of Waters, warm'd equally, struck a small Purple, then this seems the best way to warm or preserve Mineral Waters, to make the whole Bottle equally medicinal, or to preserve a Mixture of the Volatile Vitriol, that may be equally mix'd with the whole.

18. Since the Water in the Pan tinctur'd not at all when hot, but that in the close-cork'd Phial, tho' of the same degree of Heat, struck a Purple; then this shews us, that this is the best way of warming those Waters to preserve their Virtue, and prevent the Loss of their whole volatile Parts: And since the same Phial cork'd again, and put into the Pan of Water, struck not purple a second time, then no more than one Draught should be warmed at once: And since there was a purple shade in these Waters when immediately pour'd out on Tincture of Galls, which instantly faded; then these warm'd Waters are to be drunk the moment they are poured out.

19. Since these Waters have their Specifick Gravity encreased doubly their former Gravity, upon a little time standing, and have lost their brisk, sprightly, sparkling, bubbling Property; but yet continue to strike a Tincture with Galls, &c. then it's plain, their Mineral Spirit, and Tincturing Property are two different Principles.

20. Since this Water coagulates not Milk, even upon warming and boiling with it; then is a Milk-Diet allowable and useful in various Cases, with a Course of Chalybeate Waters.

139. 21. Since a Glass-Body cannot prevent the Exhalation of either the Mineral Spirit, or Volatile Vitriol of those Waters, either on warming or standing; neither can the Pores of our Bodies and Vessels, which are much larger, and lose so much every day by Perspiration; especially seeing the Fluids are in continual Motion; and since the Waters become soon effete, and when such, do load and pass the Body and Vessels; then it's certainly very foolish to drink the Waters, when they have neither a proportionable Vent backward nor forward. Such do, by their own stupidity, not the Waters fault, expose themselves to many dangers. 2. Since by daily Experience, we are convinced of the necessity of Exercise, for promoting Digestion, Circulation, Nutrition, Secretion and Evacuation, even in a healthy

healthy state. And since the most healing and efficacious Principles of those Waters are so very separable and volatile, and the Vessels so very improper to retain them long; then must we take care to use Exercise along with them; first, as it's so proper an Assistant to the Waters; then, that the common Vehicle may be carried off, together with the more separable parts, that the last being gone, the other may not continue a sluggish, heavy, palling Load in the Body. 3. Since we are convinced, that by violent Motion, the Blood's Motion and Momentum are encreas'd, its Consistence thinn'd and rarefy'd, its Globules too much divided, and thrown into the Orifices of the smaller lymphatic Arteries, the subtiler parts attenuated and expell'd; then must we not use too violent Exercise, lest we throw the grosser and unprepared parts of the Blood, now thinned, into the smaller Vessels, and promote too early an Expulsion of its necessary finer diluting Parts, and so elinch those Obstructions we came to get cured. 4. But since Exercise must be used, in order to attain the great and valuable Ends, it necessarily follows, that the expected or desired Secretions and Discharges must be made, when the secretory Vessels are emptiest, most patent and passable, which is in the Morning, the preceding Night's Rest having relaxed and expanded all the Vessels of the Body, dilated their Pores, and encreased the Blood's circulating Force; all which contribute to the Commixture of the sundry parts of the Blood, its Attenuation, throwing off superfluous Parts, and unloading the excretory Ducts on the Body's surface. Therefore the Blood's quantity being least, its Parts best mixed, freest from superfluous Redundancies, and fittest for free and easy Circulation, the Vessels clearest, most invigorated and elastic in a Morning, the Commixture of the Water with the Blood, and its Secretion therefrom again, by the help of Exercise, must be most expeditely performed in a Morning. 5. Since a healthy Secretion depends so much upon a thorough Digestion, Mixture, and due Diminution of the Parts of the Blood, Patency of the Vessels, secretory and excretory Ducts, it's unreasonable and rash, to drink a large quantity of those Waters, after a full Meal, especially when the crude Chyle is yet mixed with the Blood in the larger Vessels, unattenuated and unprepared for passing the secretory Tubes; and yet by throwing in much Water, encreasing the Blood's quantity, dilating and weakening the Vessels, the Chyle must be carried there; but its Parts being too gross and tenacious, will very likely stop in some of the Orifices of the ex-

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cretory Ducts, the Diameters of its Parts being too large to pass the Vessels. Hence new Obstructions, instead of removing the old. But the case will yet be more dangerous, should we use immoderate Exercise after a full Meal. 6. Seeing healthy Secretions and Evacuations depend so much on the Commixture, Digestion, and Diminution of the superfluous parts of the Blood, let us mind how we indiscreetly indulge our Appetite with Meat of heavy or hard Digestion, too solid, durable, or tenacious Parts; or with Variety of Dishes, which require a greater force to complete the first, second and third Digestions in due space, or with a less given force, especially at Night, all the Solids being laid by in a relax'd passive state, except those of involuntary Motion. 7. Is Rest so necessary, for Digestion, and Commixture of the parts of the Blood, Secretion and Apposition of its nutritive, Evacuation of its superfluous Parts, Diminution of its Quantity, and the Cleansing and Invigoration of the Vessels? Then, by all means, such as have occasion for, and expect Relief from Mineral Waters, must take care, that during this Course especially, they invert not the course of Nature, in turning Night into Day, and Day into Night.

140. Next come we to *Quarndun, Guile-Thwait* or *Gillfoot, Fullwood*, and *Broomless-Moor*. The first of these lies two Miles from *Derby*; when, or by whom discover'd, I cannot learn. However, it has been of great esteem, and reckoned by some, a Specific in Coughs, Asthma, Consumption, Spitting of Blood, Hyppo, Cachexy, *Chlorosis*, deficient, obstructed, superfluous and irregular *Menses*, Indigestion, &c. The Spring neither increases nor decreases by Drought, Rain or Seasons: But before Rain or boisterous Winds, it turns white; which Colour is deeper or lighter, according to the quantity of Rain to fall, or Tempest of Wind. It never freezes in the greatest Frost. It makes a very fine Lather; mixes and boils well with Milk. It rises up towards the South, out of a Rock, like rotten Iron-stone: Its surface is level with the Earth. This Water, and *Kedleston*, mixed fresh, are first clear, instantly a Violet-Purple, then a blackish Colour. This Water put up in Bottles, wherein *Kedleston*-Water had been, turns purple; and this is peculiar to *Kedleston*, of all the Sulphur-Waters I have met with, to turn Chalybeates purple. The Oker of this Water is small in quantity, of a light brown Colour. On the top of *Quarndun*-Hill, a quarter of a Mile from the Spaw, they sunk for Coals, and found very good in great Plenty; but the Work, thro' some design, was stopt. Iron-stone gives this
Water

Water both its Principles and Virtues. It has also a little Nitre from the Earth about it. The Water kept in a Pint-Bottle two Nights, and carried a few Miles, struck the same Colours with Logwood, Galls, *Sumach*, Green Tea, and *Brasil*-Wood, as at the Spring. Two Gallons of it left half a Dram of a light colour'd Sediment, above half whereof was Nitrous Earth; tho' the Authors of the *Magna Britannia*, according to their blundering custom, tell us, it's as rich of the Mineral, and brisk in Operation, as the *Yorkshire* Spaws. I suppose, they mean *Scarburgh*; whereas there we have not a Grain of fixt Salt to a Pint of the Water, which can enable it to operate no more than the Pressure and Bulk of the Vehicle.

141. *Guilethwait*, or *Gillfoot*-Spaw was first discover'd in 1664, by Mr. *George Westby* of *Guilethwait*, who had studied Physick. He soon built a small House over the drinking Well, and made below it a large Receptacle or Bath, for several People to go in at once. He, and Dr. *Tarburgh* of *Newark* on *Trent* were great Favourers and Promoters of it while they liv'd, gave all Encouragement, and provided all necessary Conveniencies for Strangers that resorted to it: Nor was the Water behind-hand with them, in producing very great and surprising Cures. But after their Death, the Farm wherein it lies, belonging to the Duke of *Norfolk*, fell into other hands, who used Strangers so roughly, that the Place, in a few Years, was deserted by all its Guests. The Spaw rises out of the North side of *Bole-Hill*, where is a Delve of Greet-stone for Grindle-stones; but near the Spaw is Iron-stone. It leaves very much Oker in its course, of a deep reddish brown Colour. Its Surface is cover'd with a thick blue Scum; its Mud is very full of Sulphur. The Colour of the Water is clear, but becomes whitish by standing; its Taste very ferruginous, and Smell Inky. It crudles Soap, and boils with Milk well. Five Gallons of it exhal'd, left six Scruples and a half of Sediment, three whereof was a dark brownish Oker, and three Scruples, Salt, which dissolv'd in distill'd Water, it suddenly crudled Solution of Silver. The whole Liquor was a deep Purple. With Oil of Tartar and Spirit of Hartshorn, the Liquor was clear, and a large white Sediment. With Tinctures of Logwood and Rhubarb, a deep reddish Brown; with Tincture of Galls, a deep Oak-Leaf Green, and much Sediment. The fixt Salt from other five Gallons of it, separated from its Earth, and set to crystallize, afforded mostly Nitre, with a few small Crystals of Marine Salt. This Water has done very great Cures in Vomitings, Belchings, Flatulencies, Hyppocri-

Indigestion, Cachexy, Cacoehymy, Gravel, Sand and Stone, obstructed Catamenia, Green-sickness, Heat and stoppage of Water, bilious and habitual Cholicks, Acidity and Acrimony of the Humours of the Body, Heart-burn, nidrous Belchings, habitual Thirst, &c. The Clay in its Stream taken up, dried, kept in a Box, and moisten'd, made into a Paste with common Water, has been found very effectual in softening Corns, and making them fall off without pain or trouble. The late Duke of Leeds was never without it, for this purpose, either in Town or Country. It's also sovereign, in curing old Sores, Ulcers and Swellings. Dr. Joseph Brown has given an Account of some of its Cures^d.

142. Ful-

^d *An Account of the wonderful Cures performed by Cold Bathing*, 2d Edit. 1707, 120. P. 144.

P. 16, 17, 18. A surprising Cure was performed by the Oker of Guilthwait-Spaw near Rotheram, on a certain poor Man, aged above 40; who having a scald Head from his Infancy, he mixed this Oker with Clay, made it like a Cap, applied to his Head, which he also wash'd daily in the Spring, and was perfectly cured, got a fresh Head of grey Hairs as white as a Child's, tho' quite bald before, and never had a Hair on his Head in his Life. One Will. Mercer, a Day-tale Man to Mr. Westby, aged near 60 Years, had always a thin Head of Hair, but by a Fever became intirely bald; by the same means had a strong thick Head of Hair restored. One Weston, a Shoe-maker in Westgate Rotheram, had a Cancer in his Breast, which had spread it self all over the intercostal Muscles, eaten them, and laid the Ribs bare to sight; after he had in vain tried all other Advice and Medicines he could procure, he washed daily in the Water, and applied the Clay and Oker in the Stream; and beyond, and contrary to all human expectation, he got perfectly cured in one Summer-season, was healthy and free from this Distemper to his death.

The Clay, (p. 57.) of Chalybeate Waters cleanses, mollifies and discusses all

kind of swellings, heals old running Ulcers, and the most virulent corroding Cancers. Many from Sheffield, become Paralytic by Mineral Fumes, come yearly to Guilthwait Spaw, bathe, and are relieved by it. Simon Shore, an Apprentice-Boy in Sheffield, to a Button-maker, got such a weakness in his Limbs, that he quite lost the use of his Legs. He bathed here twice a day during the whole Summer-season, grew so strong, that he could walk both times a day from Rotheram hither, which is two Miles. He recovered his Health and Limbs, only escap'd with distorted Knees. And it has restor'd several, whose Knees knock'd together as they walk'd. And several that came with Crutches, have left them, and returned home cured. And such Labourers as have been numm'd, and lost their Limbs by lying out in the Night-Dews, have presently fled hither for Relief, and found it. He has seen deplorable Lameness and Weakness through all the Joints often and happily cured by it in a short season; as also Rheumatic Pains in all the Joints, with continual Heaviness and Oppression at the Stomach, Fainting Fits, and swellings in the Limbs, perfectly removed thereby. And also Scab and Leprosy are effectually remedied thereby, &c.

142. *Fullwood-Spaw*, or *Eaton-Spaw*; the first Name it has from the next Village, about a Mile off; the last, from its Benefactor, the late Mr. *Tho. Heaton* of *Sheffield*; who laid a Basin, built a House over it, and made a Way to it, from his great Philanthropy. It lies about four Miles South-West of *Sheffield*, rises up on the North side of a most desert, heathy, mossy Mountain, is intensely cold, beyond any other Chalybeate Water yet met with; and at the same time it's forty Grains lighter than common Water, at the Spring, and twelve Grains in a Pint only lighter, when it has stood an Hour or two; that is, it's twenty eight Grains lighter when just taken up, than it is two hours after. It was of very great Note formerly, much frequented, and vast benefit reaped from its use, in all Cases wherein light Chalybeates take place. I have been told, that there was once a Treatise wrote upon it; but after my strictest Enquiry, I cannot learn when, or by whom. It sits exceeding light on the Stomach, goes quickly off, is a powerful Diuretic, forcing its way through Obstructions, raises the Spirits, takes off gloomy, pensive, melancholy Clouds and Damps, sets all Irregularities of the *Menses* at rights, breaks through removable Barricades in the Liver, Spleen, or other *Viscera*, restores a lost Appetite and Digestion, clears the Stomach, Kidnies, Intestines, Ureters and Bladder; helps Stuffings and shortness of Breath; deposits and converts the pent Mofs in its stream into Oker, whereof there is the most monstrous quantity here I ever met with in one place. At the side of the Basin might be made an excellent and first-rate Cold Bath in all the Neighbourhood. It constantly throws a small white Film, like Goldbeaters Bladder. A Phial filled a third part full of its Water, cork'd close, and set in a Pan of Water, and put over the Fire, when the Water was scalding-hot, the Bottle threw forth its Cork, with a Crack like that of a Pistol. But when the Water boiled, it struck no longer Purple with Galls. Whilst I was weighing the Water, the hydrostatic Ballance fell into the Well, and mudded it. However, twenty eight Pints of it taken up in this condition, and exhal'd, left only nineteen Grains of Sediment, eight whereof were Earth; so that the Sediment of this *Spaw* is to its Vehicle, scarce as 1 to 10752. These thirteen Grains of Salt dissolved in distilled Water, it precipitated the Silver, and left the Liquor perfectly clear. It turned Tincture of Rhubarb of a dark blackish Yellow; with Solution of Sublimate, of Sugar of Lead, Oil of Tartar and Spirit of Hartshorn, it remained perfectly clear, after two Days stand.

standing ; with Syrup of Cloves, a dark blackish Green ; with Syrup of Violets, a muddy Clear ; with Tincture of Logwood, an opaque Blue, or deep Black, till much diluted, and then a fine transparent Blue ; with Tincture of Galls, *Sumach*, and Green Tea, a beautiful Purple. So that we say, tho' there neither is, nor has been any Coal-pits or Iron-works, or other Sloughs or Levels here, it contains a little Earth, a volatile and fix'd Vitriol, with a small pittance of marine Salt.

This *Fullwood* joyns to *Riveline-Moor*, which formerly (when the Lords *Lovetofs*, *Furnival*, *Shrewsbury*, &c. had their Residence at *Sheffield-Castle*) together with *Loxley*, *Stanington*, &c. made a fine Chase of about sixteen Miles Circumference. *Thomas de Furnival* got a Charter for a Weekly Market at his Manor of *Sheffield*, in 1295, and two Fairs yearly ; which Town has flourish'd ever since, and is now computed to contain near 20000 People, tho' an Historian tells us, in 1731, that it's a small Market-Town.

143. *Broomless-Moor-Spaw*, near five Miles from *Bradforth*, lies in the middle of a rotten Peat-Moss ; but has an excellent little Basin made for it, and a Drain cut to carry off all the Water and Sludge, by that worthy Gentleman *Richardson Farrand*, Esq; Proprietor of the Grounds. The Water is very clear, strong of the Chalybeate, and a notable Diuretic and Opener of Obstructions ; is always covered with a thick blue Scum, and leaves much Oker in its Stream. Three Pints and an half of it exhal'd, left only twelve Grains of Sediment, five whereof were Salt ; which crystalliz'd into small Crystals of Nitre. This is the strongest, purest, lightest Chalybeate in those Bounds ; tho' they have many, yea, almost endless in number, and many of them proceeding from Coal. The proportion of Sediment is to the Water, as 1 to 2240.

With	Quarndun,	Guile-Thwaite.
Solution of Silver, — of Sublimate, — of Sugar of Lead,	a bluish Purple. white, and crudled. white, with a dusky sediment.	bluish White, and a fedt. white. white then great sedi- ment.
Oil of Tartar, Spirit C.C.	dusk White. whitish.	a yellowish sediment. clear, and a little se- diment, clear and full of Bubles. bluish Green. blackish and a purple Cast.
Acid Spirits, Syrup of Violets, — of Cloves,	bluish Clear. a light Blue. a fine dark Violet.	a deep Red. deep Mazarine Blue. a deep purple Red. Purple, then opaque. dark dirty Purple. first dark, then a char- ming Purple.
Tincture of <i>Brasyl</i> , — of Logwood, — of Galls, — of Green Tea, — of Red Roses, <i>French Brandy</i> ,	a light Red. beautiful deep Blue. a shining Purple. deep crimson Purple. blackish Purple. blackish Purple.	

With

With	Fullwood,	Broomfmeer.
Solution of Silver,	bluish White.	pale Blue.
— of Sublimate,	clear.	faint Orange & crudl'd
— of Sugar of Lead,	clear.	white clear, small sedt.
Oil of Tartar,	slight yellow Clear.	yell th .crud.& yell.Clds.
Spirit C.C.	pale Yellow.	pale Yellow.
Acid Spirits,	clear and full of Bubles.	clear and full of Bubles.
Syrup of Violets,	greenish Blue.	yellowish Green.
— of Cloves,	dark fine Blue.	
Tincture of <i>Brassl</i> ,	purplish Red.	fine deep Red.
— of Logwood,	very fine deep Blue.	very deep purplish Blu.
— of Galls,	Mazarine Purple.	very pleasant Purple.
— of Green Tea,	purple.	blackish Purple.
— of Red Roses,	bluish Purple.	deep greenish Blue.
French Brandy,	blackish Colour.	blackish.

245. *Ashover-Spaw*, four Miles from *Chesterfield*, and four from *Matlock*, rises Southward, at the foot of a small Hill, called *Twitchbank*: It empties itself into *Marsh-brook*, about ten Yards below, lines its Course with much yellow Oker; its Stream is very weak and small by Day, but much stronger all Night. The Rains and Drought neither affect nor alter its Quantity; yet in Winter it throws out the same Quantity Day and Night. It rises out of a Bed of Shale two or three Yards thick, and about half a Mile long, till it is cut off by a Bed of Lime-stone, between which lies the Ore (This is peculiar to this place) Much Iron stone is mixed with this Shale. This Water is a dark pale Purple with Tincture of *Brazil-Wood*; first a deep Blue, then an opaque bluish Black with Tincture of Logwood; first a red purple, then almost Ink-black with Tincture of Galls. It was first pearl, then purple with Solution of Silver. With Solution of Sublimate it was whitish, with a variegated Pellicle; green with Syrup of Violets. Seven Pints and a half of it exhal'd, left 27 Grains of sediment; the Salt whereof dissolv'd in distill'd Water, when the following Mixtures had stood four Nights, it turned Solution of Silver purple. With Oil of Tartar, it was first white, then let fall a sediment like white Sand. It was white with Spirit of Hartshorn, clear with Syrup of Violets, blackish clear with Syrup of Cloves, a Sack colour with Tincture of Logwood, clear with Tincture of Galls. Hence it contains only a volatile Vitriol, a little Nitre, and some Oker. Its sediment is to its Vehicle as 1 to 2133.

245. We have also another Chalybeate on *Burleigh-Moor*, near *Sheffield*; and one at *Beighton*, a Mile and half East of it. The first abounds with volatile Vitriol; eight Pints and half of it exhaled, left 39 Grains of whitish colour'd sediment, the Salt whereof precipitated Silver, and gave a small sediment, with Oil of Tartar and Spirit of Hartshorn; but was very clear with Tincture of Galls. Therefore it has no fixt Vitriol, but marine Salt, with a little Nitre. Its sediment is to its Vehicle, near as 1 to 2176.

Beighton-Spaw is a Light Chalybeate, is very drying, healing, diuretic, and stomachic; it contains only a little Oker, and some marine Salt, no fixt Vitriol. Both these boil with Milk, and make a good Lather with Soap. We have also one at *Darnal*, two Miles from *Sheffield*; a wretched heavy one, in the Pond-Lane in *Sheffield*, the product of Coal. Mr. *Crasshaw's Chalybeate*, which is very clear and pure, but weak. All the Water that supplies the High

House, the Seat of *George Bamfort, Esq.* is a small Chalybeate. Another at *Bithams* in *Bradfield-Parish*; several in *Ecclesfield-Parish*; one at *Cranmore*; one at *Ulley*; another on *Whiston-Common*; one below *Rawmarsh*; *St. Peter's Well* near *Doncaster*; one at *Ranfield*; one at *Darfield*; one between *Barnsley* and *Uper*: But indeed, there is no end of reckoning them; *Torkshire* alone supplying us with at least ten thousand such.

146. The Chalybeate near *Matlock Bridge* is weak of the Mineral Spirit, much Volatile Vitriol, has but a nauseous taste, nor goes it quick off the Stomach. One Drop of Tincture of Logwood to a Glass of it makes a fine Blue. With two Drops of Tincture of Galls it's a deep Crimson; with Green Tea it's a blackish Purple. It contains no fixt Vitriol, but a little Nitre. Seven Pints of it exhald left half a scruple of sediment: so that the Sediment is to the Water as 1 to 5376. There is also a strong Chalybeate in *Wirksworth*, which, if it had a small Bason, that it might clear it self, would do good service; but at present the Receptacle is too large. Hence the Water loses its Mineral Spirit, is muddy, and unpleasant to the sight. It gives all the same *Phænomena* as *Matlock-Chalybeate*; five Pints of it exhaled left a Dram of sediment, 36 Grains whereof was Earth, the other twenty four were Nitre and Marine Salt, upon Crystallization. The Sediment here is to the Water, as 1 to 640. There is also a finer Chalybeate at the South End of the Town, in a Marshy Meadow, called the *Fish-Pool Flat*, at the foot of a fine Hill. Its Stream is damm'd up with a very reddish brown Oker, the Water cover'd with a Scum, and a thick strong Lather like Soap: Galls alter'd it not in the least for seven minutes, and the Tincture of Galls struck it in two hours a bluish Purple; Tincture of Logwood, a fine deep Blue; Tincture of *Brasil*, a small Purple; Green Tea, a blackish Purple; the acid Spirits smoak'd with it, and fermented. A Quart of it exhaled, left three Grains of black sediment; which is to the Water, as 1 to 5120. It's a fine colour, sparkles and bubbles when pour'd out; has no Inky smell, nor nauseous taste; but has a most delicious, Nitrous, pungent Flavour, like *Pymont-Waters*. It rises out of Earth-shale and Greet-stone. This I call *sui Generis*, having found none like it in *England*. Its Salt makes Solution of Silver a little whitish, is clear with Tincture of Galls: Wherefore it contains only a noble Volatile, but no fixt Vitriol; is rich of Mineral Spirit, and has a light volatile Nitre.

At *Dofield-Bridge* in the Long Close, is a Chalybeate, which rises up

up at the foot of a Descent, a Mile North of *Quarndun*, about 12 or 14 perpendicular Yards lower. It is neither so light on the Stomach, nor so pleasant as *Quarndun*. Five Pints of it exhal'd, left ten Grains of sediment; which is to the Water, as 1 to 430. There is also another Chalybeate in the *Backmores Close* at *Dosfield*: It lies in a flat boggy Ground, overgrown with Rushes. They have a third in the middle of the Town, which burst up about thirty Years ago, in boring for Coal, is wall'd about, and pav'd, call'd *Dosfield Spaw*. It rises the thickness of the Bore, from a subterranean Current fifteen Yards deep. They have a Fourth, called the *Paper-Mill-Spaw*, rises in a flat Ground, therefore overflow'd with Floods. It abounds with Sludge and Oker, and is cover'd with a thick variegated Scum. All these lather with Soap, and boil with Milk, but a little heavy upon the Stomach. At *Eaglester*, *Rousely-Bridge*, *Burgh*, *Hope*, *Castleton*, *Chesterfield*, *Whittington*, *Beauchief-Abby*, *Woodseals*, &c. are more of those *Spaws*. They mostly rise out off Shale, with Iron stone or Marcasites of Iron, except *Chesterfield*, *Dosfield*, *Whittington*, *Beauchief-Abbay*, which spring from Coal chiefly, and a little Mixture of Iron-stone: For to one that is accusom'd to them, it is easy to discover when they come from Coal, and when from Iron stone, mostly. Six Pints of *Castleton-Spaw* left ten Grains of sediment; three Pints of *Burgh-Spaw* left six Grains of sediment.

147. The following are chiefly the Product of Iron-stone, viz. *Burleigh-Park-Spaw* by *Stamford*, just by the Right Honourable the Earl of *Exeter's* House. It weighs fifty Grains in a Pint lighter than common Water, at the Spring, but gained thirty four Grains, by carrying it to *Stamford*, and standing an Hour in a Pint-Mug. It is green with Tincture of Nephritic Wood, and lets fall a yellow Precipitation; blackish Brown with Tincture of Rhubarb, and lets fall an Orange-Precipitation; with Solution of Sublimate, clear, and has a small light colour'd sediment, with Solution of Sugar of Lead; clear, with a very little sediment, with Oil of Tartar; clear, and a yellowish sediment, with Spirit of Hartshorn; a transparent deep Green, with Syrup of Cloves; green, and crudled, with Syrup of Violets; clear, and a large blue sediment, with Tincture of Log-wood; deep opaque purple Liquor, clear, and much deep purple sediment, with Tincture of Galls. Five Pints of this Water exhal'd left fourteen Grains of sediment, nine whereof was Salt marine and Nitre mixt; the Earth was Oker. This Water is exceeding light, strong of the Chalybeate, rich of the Mineral Spirit, if drunk at

the Spring, has few fixt Parts, and very little Earth. About a Mile and half from this, is *Wittering Spaw*; it's as clear as Rock-water, has a harsh Chalybeate Taste, there is a little Oker in its Stream and Basen; it weighs sixteen Grains in a Pint lighter than common Water, at the Spring; but gain'd four Grains at the Town. It is a dark Pearl, with Solution of Sublimate, has a small brown sediment, with Solution of Sugar of Lead; pale, muddy, with Tincture of Nephritic Wood; lets fall a yellow sediment, with Oil of Tartar; was a deep Green, with Syrup of Cloves; a bluish Green, with Syrup of Violets; bluish Clear, and a little crudled, with Tincture of Logwood; deep bluish Green, and a small purple sediment, with Tincture of Galls. Twelve Pints of it exhald, left almost four scruples of sediment, very black. Half a Pint of each of those Waters let stand all Night in uncork'd Quart Bottles, next Morning they gave not the least Tincture with Galls, or *Sumach*, or Green Tea. The Genus of the sediment of this Water is the same with the last, only it contains less of the Minerals, volatile and fixt. Its Salt dissolved in distill'd Water precipitates Solution of Silver; gave a small sediment with Oil of Tartar; with Tincture of Galls, a blackish sediment; with Tincture of *Sumach*, a black sediment: so that here is a small Track of fixt Vitriol in *Wittering*.

Two Miles from *Stamford*, is *Tolthorp Spaw*, whose Water is very clear and pleasant, weighs little lighter than common Water; strikes a deep Cherry-colour, with Tincture of Galls; perfectly clear, with Tincture of Logwood; and a light Yellow, with Tincture of Rhubarb. Hence, it is only a weak Chalybeate, slightly impregnated with Minerals, tho' the oldest *Spaw* in this Country, and formerly of considerable Note, as a Drier of Rheums, Sores, &c. *Grantham Spaw*, without *Spittle Gate*, rises out of a hot sandy Ground, under which is a fine Gravel. It springs up in a small Descent, beyond the *Mitre*, is a very strong large Spring, weighs two scruples in a Pint lighter than common Water; brisk of the Chalybeate: When the Mixture of this had stood all Night (as those of *Wittering* and *Burleigh* had done) that with Solution of Silver was clear, and a little whitish; that with Tincture of Logwood, very green, and a small sediment; with Tincture of Rhubarb, a deep Yellow; that with Solution of Sublimate, whitish, without sediment; that with Solution of Sugar of Lead, whitish, crudled, and let fall a white Pouders; with Oil of Tartar, white, crudled, and let fall a white small sediment; with Spirit of Hartshorn, first whitish, then let fall

fall a greyish Incrustation, but no sediment; with Syrup of Cloves, a dark Green; with Syrup of Violets, greenish; with Tincture of Logwood, first clear, then a bluish Black; with Tincture of Galls, first a light Cherry, then let fall a small sediment, Liquor above a fine transparent Azure colour. A Gallon of the Water exhaled, left a Dram of sediment, thirty six Grains whereof was a light whitish colour'd Earth, the other twenty four Grains were Nitre only. This is a beautiful light Chalybeate for drinking, and would make a special good cold Bath for Pains, Weakness and Lameness.

Didersly Grange Spaw, on *Gattersly Moor*, near the Rt. Honourable the Lord Darcy's, by *Richmond, Yorkshire*, in the Parish of *Melfenby*, is a weak Spring, runs full South, a very clear Water, with a thick blue Scum upon it, tastes strong of Iron, and smells of Ink. It lies in the bottom of a Common in a Boggy Moor, two Miles from *Melfenby*. Several Attempts have been made to find Coal there, but in vain. It lines its Basin and Stream with Oker; it is very light upon the Stomach, is a powerful Diuretic and Alterative, has been known time out of mind. It is whitish with Solution of Sublimate, a fine Pearl, with Sugar of Lead; light Yellow, with Spirit of Hartshorn; light Purple, with Syrup of Cloves; a Leaden Colour, with Syrup of Violets; light Crimson, with Tincture of *Brazil*; bluish Black, with Tincture of Logwood; a beautiful Purple, with Galls, Green Tea and *Sumach*. Fifteen Quarts of it exhal'd, left 22 Grains of sediment, sixteen Grains whereof were Earth, and eight Salt; which dissolved in distill'd Water, crudled, and precipitated in a Yellow Pouder, with Oil of Tartar. Tincture of Galls changed it not; but the two mixt, were first deep brown, then Ink-black; lastly, crudled, and let fall a black sediment; the Water above was green.

At *Whitby* is another of the same sort. It rises up at the bottom of a high Cliff of Clay, within the Sea-mark, in the Road-side from the Town to the Allum-Works. It bubbles up through the Sand, was formerly Wall'd up, had a House, and several Conveniencies for Drinkers, being found a great Diuretic, Anti-icteric, and Emenagogic, purged some, but most, not at all: But now the Sea has wash'd down all, and fill'd the Place with Stones. It is only to be discover'd from its glaring Scum and Oker. Three Pints of it exhal'd, left twenty Grains of black sediment, which affords chiefly a little Marine Salt, and some Nitre.

There

There is another of these at *High Cropton*; four Pints whereof exhaled, left five Grains of sediment, brownish, which fermented strongly with Oil and Spirit of Vitriol; was green, with Syrup of Violets; sent forth no urinous smell, with *Sal Armeniac*, neither bubbled, melted nor crack'd on a red-hot Iron; muddy and green, with Galls: Therefore only Oker and a little Nitre.

Another at *Loskelm*, near *Pickering*, which rises up in a Boggy Place, at the foot of a Hill. Its Bason and Stream are full of Oker, and it has a strong ferruginous Taste. Its fixt Parts are Oker, and a very little Nitre.

Another good light Diuretic Chalybeat at *Black Park* in the Parish of *Middleton*; lies in a Boggy Place, cover'd with Oker and Scum, Two Quarts of it exhal'd, left seven Grains of sediment.

Middleton-Spaw, near *Pickering*; two Quarts of it exhal'd, left 50 Grains of sediment, twenty whereof were Salt; which dissolved in distill'd Water, turned purple, with Solution of Silver; precipitated, with Oil of Tartar and Spirit of Hartshorn; was an opaque Blue, with Tincture of Logwood; a deep Red, with Tincture of Galls. Wherefore we say, this Salt consists of Nitre and fixt Vitriol.

Another at *Beverly*, about a Mile East of the Town, in the middle of a Bogg. It's a very diuretic, drying, cleansing, healing Water, being drunk and bathed in; and from its Sulphur, Clay and Oker, has done considerable Cures in scrophulous Cases, and other Ulcers, Scab, Itch and Lameness, Rickets and Pains. The last it has not from its Minerals, but in common with the cold Bath. It is full of Oker, and covered with a Scum, has much Spirit and Volatile Vitriol.

There are a great many other Chalybeates, even of Reputation; as, one at *Tadcaster*, one at *Atwith* near *Pontefract*, which by drinking and bathing has done great Cures in scrophulous cases and Lameness: One at *Abledumar Black Barnsley*; two or three at *Leeds*, one at *Rodhill*, one at *Thornton-Rust* in the Parish of *Asker* in *Weachdale*; one or two in *Smaledale*, another in *Arkendale*. Several of these come from Coal: But there is a very good one at *Stonny-Middleton*, *Derbyshire*; one near Mr. *Pole's* of *Park-Hall*, two or three near *Romely*, the Country-seat of the worthy and ingenious *Tho. Wright*, Esq; one in *Newall-Wood* near *Wakefield*, which is pretty light, tastes ferruginous, smells a little of Sulphur, is a good Diuretic, drunk at the Spring; but quickly loses its Chalybeate Principle, if removed; another at *Carleton* near *Barnsley*, called
Shaw-

Shaw-Spaw; another at *Dodworth*; one at *Worthy*. *Longaddingham* and *Skipton Sweet Spaw* are both of this sort, tho' very light and weak. But it were endless to number up a third part of this Class in this Country.

I shall only add one more, viz that at *Henryworth*, near *Pontefract*. It springs up in a Close, called, the *Stonney Pastures*, North of the Town, has been known only sixteen Years, and chiefly used by the late Reverend Mr. *Lamley*, and the present Reverend and Ingenious Mr. *Wrightson*, of the Place; both they and I finding it a very good Stomachic and Diuretic. It throws out above 1500 Gallons of pure light Water in an Hour, of an agreeable Vitriolic Taste and Smell, sparkles like rich *Champaigne*, sits light on the Stomach, goes off quickly, and excites a voracious Appetite, and has the other Properties of a light Chalybeate: Mixt with common Water, it makes a small faint Violet-Blue; with Tincture of Galls, a deep Crimson Red; with Brandy, a light Violet; with Tincture of Logwood, a fine light Blue; with Syrup of Violets, first blue, then greenish; with Oil of Tartar, first whitish, then lets fall a woolly sediment; with Tincture of Rhubarb, first a deep Yellow, then a dark Brown, lastly blackish; with Solution of Sugar of Lead, first whitish, then a small white sediment. Seven Quarts of it exhaled, left 22 Grains of a brackish light brown sediment, ten Grains whereof were Earth; the filtered Liquor turned instantly white, and soon let fall a sediment, with Spirit of Hartshorn and Oil of Tartar.

Lastly, *Bullhouse-Spaw*. This in *February*, tho' a most rainy season, struck a deep redish, then bluish Tincture with Galls; was very little muddy, and posited scarce any sediment, with Spirit of Hartshorn, or other Volatile Alcalies; was a noble Mazarine, with Tincture of Logwood. Fourteen Pints of it exhaled, left forty three Grains of a blackish saltish sediment. It contains quadruple the Chalybeate Principle of any other Steel-Water in this Bounds; as also a much larger sediment. Hence, no wonder, if it has gained a great Character in the Hyppo, Cachexy, and other Distempers from Relaxation, Obstruction, or a grumous fizy Blood.

148. From the whole, we observe, in the general, 1. That all those called *Chalybeates*, are diuretic, deobstruent, invigorating and stomachic. 2. They are known, from their striking Purple with Brandy, Galls, *Sumach*, Red Roses, Green Tea, Oak-Leaves, &c.
3. Their

3. Their fixt Parts bear so small a proportion to their Vehicle, that we derive their whole medicinal Virtues from their volatile Principles, viz their Spirit and volatile Vitriol; which being gone, little remains for the Drinker, besides simple Element, and a little Earth; which, however the first may pall the Stomach, and load the Vessels, the last is a very improper Messenger to send on the Errand of opening Obstructions, and curing Diseases thence arising. 4. The more Mineral Spirit, and volatile Vitriol these Waters contain, the more valuable and sanative they are at the Spring-head; but the more improper for keeping, Carriage, and much Agitation. 5. Since they are not coacuent, but Alterative, we are not to swallow down such large unconscionable Doses, as Dr. *French* prescribes: For not Violence, but Patience and Regularity assist them in the Cure of Chronic Diseases; a Quart, or three Pints a Day being an ordinary Dose. 6. Since they are Alteratives only, and require Time, Patience, and Temperance, let none disparage the Waters, or conclude them unprofitable to their Case, if they find not a Cure in a short time. It is but reasonable they should allow as many Months for the Water to answer, as their Distemper has probably been Years, in gathering strength; or Weeks, as they have had it Months. In other Countries, Patients can allow two or three whole Summer half Years, and find Relief at last; we only a few Weeks: Hence these Waters are generally more beneficial there than here.

Again, since these Waters are Alterative only, a Course of Purgatives interlaced with their use, seems highly unreasonable, and inconsistent with the Design; since they weaken the Stomach, drain the Blood, and determine the Operation in that Way. And on the last Account, Diuretics are no less culpable, some few Cases excepted. As for the Rules for drinking the Waters, and Use of the Non-naturals, nothing need be added to what Dr. *Dean* and Dr. *French* have said on *Harrigate*. 7. We find, these Waters come from 1. Iron-stone; 2. Shale, or a Mixture of Shale and Iron-stone; 3. Coal, or a Mixture of Coal and Iron-stone. Such as are derived from the first, are of a far more agreeable Taste, sit lighter upon the Stomach, are much sooner expelled the Body, and invigorate and exhilarate much more. Such as are the Product of Coal, as *Chesterfield* and *Whittington*, *Sheffield Ponds*, *Melton near Rodhill*, and *Park-Hall Spaws*, are more nauseous to the Taste, load and weaken the Stomach, go slowly off, and leave a smarting disagreeable sensation in the Throat. 8. The

8. The more Sulphur they contain, the more effectual is cold Bathing in them; but especially, the use of their Scum and Clay, in Disorders of the Skin; as, Ulcers, Eruptions, Excoriations and Corrosions. Hence *Guilethwait*, *Beverley*, &c. *Spaws* Clay and Oker are found most effectual. Their different proportions of Sulphur are discoverable from the Blackness of their Sludge, and from its Inflammability when dried. 9. Some of those Waters contain a fixt, as well as volatile Vitriol; as *Fullwood*, lower *Normansy*, *Middleton* by *Pickering*, *Mare-Spaw*, &c. which is discoverable from this; the sediment remaining after Exhalation, being dissolved and filtred, the filtred Liquor strikes Purple with Galls, and Blue with Tincture of Logwood. Or, if you exhale the Water in the filtred Liquor, and dissolve the dried Salt in Water, Green Tea, Galls and *Sumach*, all strike this Solution Purple; which, I think, can scarce be deemed to be Vitriol. As to *Mare-Spaw*, I cannot possibly recollect from whence I had it, having lost my Paper in which it was, and had only the sediment remaining, which projected (upon separation from its Earth) some very curious Rhomboid Crystals of immature Vitriol. However, the Loss of this Paper can give no advantage to *Dr. Lister's* Disciples; and the speculative Gentlemen, who have, by some hocus-pocus Art, exorcis'd fixt Vitriol out of all Mineral Waters, as a rank Poyson, and yet can very successfully prescribe Salt of Steel, *Vinum Chalybeatum*, Tincture, and other Preparations of Steel, which all contain Vitriol; this, I say, can do them no service, since we can direct them to many other Chalybeate Waters we know, which contain fixt Vitriol.

149. All Coal-Waters in this Country contain fixt Vitriol; as, those above *Buxton*, call'd the *Allum-Wells*, *Westwood-Spring* near *Tanderfley*, &c. which is discoverable from the Waters striking blue with Tincture of Galls, instead of Purple: And the Waters exhal'd, the Salt separated from the Earth, and set to crystallize, you have beautiful Crystals of mature Vitriol, and no other Salt. They also make a most beautiful clear Posset-drink, squirted into New Milk, if they are full of Vitriol, as *Westwood*. This (and I doubt not, but the rest are the same, in proportion to their Vitriol) most effectually and certainly cures the most stubborn and Chronic Ulcers, especially those of the Legs, which often prove the Reproach of Physick; nor will they yield to a Salivation, very often. I had a Servant-Maid, who had, (before she came to me) the most frightful, and even monstrous ulcerated Leg I ever saw, for five Years, prodigiously swell'd,

livid and useless ; a Man might have hid his Fist in one Ulcer ; very foul, and of a blackish green Colour. Her Parents and she used all the Means they could possibly procure, but in vain, till I advis'd her to wash it twice a day at home with this Water, which cured it in three Months time, tho' she had plied it twice as long with *Guilthwait*-Water and Clay, to no purpose. My Servant-Boy received a Hurt by a Horse upon his Shin, which, in spite of Driers, Healers, and red Precipitate outwardly, and Calomel and Calomel-Purges inwardly, turned to an Ulcer at six Months end : But one Quart-Bottle of this Water cured it, took off the swelling, and restored his Limb. A young Gentlewoman had a very small Sore on her Leg for some time. I advis'd to the Use of *Harrigate-Sulphur-Water* ; she went, and bid Good-morrow to the Place, returned the same Week uncured ; took abundance of Calomel, then was salivated, used Decoctions of the Wood, &c. but all in vain. I intreated her to use this Water, which would certainly cure her : But this friendly Advice was too simple and plain for Madam ; she liked Physick better, and a sore Leg. I heard six Months after, it was *in statu quo* ; and what became of it after, I have not heard : But, very likely, it prov'd, at least, an annual Ulcer.

PART IV. and V.

Of Purging and Plain Sulphur-Waters.

150. **T**HESSE are of three sorts, viz. such as contain only Marine Salt ; such as carry in them Marine Salt and Nitre ; and such as have Nitre only. Of these we shall begin with *Harrigate* ; which certainly is the most incomparably strong Sulphur-water in *Britain*. There are several of them here.

151. They lie in the following Order : About a Mile and quarter West of *Harrigate*, on the Brook-side, is a small Out-break of a strong, saline, sulphureous Spring, which blackens the Water of the Brook, and makes the Earth of a deep Ink-black Colour. A Mile East of this, in the Bogg above the Village, we find several more of these Springs. About thirty Years ago, when the Concourse of People was very great to this *Spaw*, one *Robert Ward*, an old Man, made a Bason in the Clay, under the Moss of a Bogg, where the strongest and briskest of those Sulphur-Springs rise ; and gathered half a Hoghead of Water at a time, for the use of the Poor : But when he laded this, he almost dried the three Sulphur-Wells at the Village : Whence it is evident, they all have the same Origine, and communicate with one another.

This Bason was about six Yards North-West of the Allum-Well. See how near Springs of a very different nature are to one another ! Even in a loose Bogg, inaccessible in great Rains, which yet never affect these Springs. Near five hundred Yards East of the Bogg, over a small dry Hill, lies the first of the three Sulphur-Wells, on the North side of the Village. A Yard East of this, is the second ; and five Yards and a half East of this, rises up the third. These three being the only Springs of this kind in use here, they have very pretty little Stone-Basons laid for the Water to rise up into, and are each enelos'd in a small neat Building of Stone and Lime, about a

R r 2

Yard

Yard square on the Insides, and near two Yards high, covered over with two thick smooth Flag-stones laid shelving. After the Water is emptied out of the Basons (which by some poor old Women there are always kept exceeding clean) and stagnates for some Hours between the Bason and Brook, the Earth where it stands, is Ink-black, and in Summer it is covered with a thick white dry Scum; which taken off, and dried in the Sun, burns in the Fire with a blue Flame, and strong smell of Sulphur; the same does the black Mud at bottom when divided. When Dr. George Neal of Leeds attended this Place, (which he, and his Son, the late Dr. John Neal of Doncaster, did for sixty seven Years ^a) they were oblig'd to lade up the Basons,

^a This is a begun Piece; which was never finish'd, though he liv'd many Years after. He had made and prepar'd a very curious Collection of Observations, which are either lost, lent out, or mis-laid; so that the late Doctor's Widow (who freely gave the following Fragment, to be communicated to the Publick) could not find it, after a most strict and careful Search.

Spadaerene Eboracensis: Or, *The Yorkshire-Spaw*, near *Knaresburgh*: Being a Description of Five famous Medicinal Wells, viz. 1. The Sweet Spaw. 2. The Sulphur, or stinking Well. 3. The Dropping Well. 4. The Black Spring, found out by the Author. 5. *St. Magnus's*, or *St. Mungo's Well*. All which Wells, with their Situation, Operation, Virtues, &c. are described. Together with the Hot and Cold Baths; as likewise Fume-Baths. By *Geo. Neale*, Sen. M. D.

I shall begin with the Sweet Spaw. This rises very pleasantly, on a fine Ascent, for a Mile, or more, of Ground, bubbling up with a good Stream. It continually throws up small Sand, or Gravel; a good sign of a perpetual Spring, which never fails Winter nor Summer, in Drought nor Rain; but continues the same Stream, enough to suffice thousands of Drinkers.

I was at the first opening of the Ground, when the Trenches were digg'd, the Breast-work and the Walks made; which were done without due Consideration, and many Inconveniencies succeeded; as, to draw from upper Grounds all Rain-Water, by digging so deep upon the West and North-west side, that all the Spring was drawn away, and the Bason empty in an Afternoon, when there was the greatest Appearance of Water-drinkers of all Ranks I ever saw. I was not a little troubled at the Capriciousness of the Person who carried on the whole Design, to aggrandize himself with the Benevolence of the Benefactors; and with Tears in my Eyes, presently got Workmen, to fill up, first with Earth and Stones, then with Sodds of Earth well rammed down, and with Gravel, Hurdles, Branches of Trees, filled up the Trench, and sodded it over at last, or we had lost our Spring: For it got Vent into the Boggs West and North-west from the Fountain-head, and ruin'd us.

I observ'd, all the Ground about the Wells, after it was open'd about half a Yard deep, upon the North and South-East side especially, was a bluish kind of Clay, which tasted of Vitriol. Many Iron-stones were thrown up (all the Ground thereabout being formerly digg'd up, and all the Wood destroyed in Queen Elizabeth's time, by Iron-Forges) that the Spring passing through both in *solutis Principiis*, must

fons (the Water having found some other Outlet,) and under them they found great Quantities of yellow subtimed Flowers of Sulphur; and a Man may at any time precipitate a fix'd Sulphur in those Waters. Old Rags, Straw, Sticks, Leaves, Grass or Moss lying in the Course of those Waters, are covered with a white hairy Mucus. A Mile East of this, in the Middle Way to *Knaresburgh*, in a low Ground, by a small Brook-side, rises up *Knaresburgh Sulphur-Water*. Half a Mile North from this, is *Bitton-Spaw*, in the Park, near by Mr. *Stoughton's*.

must partake of both. Yet one Mineral more must be allow'd, *viz.* Nitre, which abounds in all fat Clayie Earth: For if you dissolve it in Water, filter and evaporate it, you drein the Salt of Nitre from it, and by Evaporation make Salt-Petre of it, as has formerly been done in most parts of this Kingdom, to make Gunpowder. Let this wash'd Earth be again exposed to the Air, and in six or seven Years, it will be as full of Nitre as ever: Nay, the very Nitre of the Air unites it self with the Vitriol of the Spring, and to the Water, as we drink it; and will, as quickly as you can fill a Glass, cover it with a thin Cloud that foretels what Weather you are to expect. The necessity of Nitre in the Air, for preserving Animal Life, is now very obvious to Philosophers, for rarefying, enlivening and inflaming our Blood and Spirits; so to attenuate them, as to make a Passage and Circulation thro' all Parts of the Body: For the Nitre, together with the Air, is drawn into the Lungs, mixt there with the Blood, and thence presently transmitted to the Heart.

From what I have said, I am inclined to think, that the Water of this Spring contains Nitre, Vitriol and *Mars*, which are the usefulest Principles any Mineral can be impregnated with; all of them being of great use for our Preservation; and we cannot live many Moments without Nitre; so it is disputable, whether Vitriol or Iron may be spared.

As to the Virtues of this Spring, there is scarce any Disease incident to Mankind, wherein its inward or outward Use

may not be of service. I have been an Eye-witness near forty Years of its Effects; and I have not neglected drinking it my self, any one Season all that time; and tho' I am now in my 66th Year, yet I am strong and vigorous, free from the Complaints of Old Age: Nay, let me add further, that it often finds out a Distemper sooner than a Physician: For when I have met with Patients labouring under such a Complication of Chronic Diseases, that I scarce knew which chief Symptoms to relieve first, I have caused them to drink of this *Spaw* three or four Days, or longer, (giving only a gentle Preparatory to open the Passages) and it seldom fails to indicate where the greatest stress lies, and point out the Method of Cure, by working chiefly on the Parts affected.

But because a general and just Commendation of this Spring will not be satisfactory, without condescending to enumerate the Diseases wherein it's proper, and some Directions for its Dole, Use, and how to prepare the Body for it; It's good therefore, to restore a lost Appetite and Digestion, to mitigate the Scurvy, correct all acid Humours in the *Lympha*, Blood, nervous and pancreatic Juices. It cleanses the Kidnies and Ureters of Slime, Sand, Gravel and great Stones, and is very assistant in curing Ulcers in those Parts. It removes the *Hyppo's* Melancholy, opens Obstructions of the Lungs, Liver, Spleen, Mesentery and Glands. It purifies the Blood, and renders the Spirits in the Body more chearful and lively. Several short-winded, Asthmatic, weak, and

son's. These three first send forth such a strong smell, that it is perceived at a good Distance by Travellers, in moist and rainy Weather; and before Rain, they bubble up with such an impetuous force, that they are heard a good way off; though neither Rain nor Drought increases or decreases their Springs. Hither also the Pigeons resort from all Parts about, to pick up the candied Sea-salts, which

and lame People, have had their Lungs and Limbs restored to their former strength and usefulness. It relieves inveterate Head-Aches, especially if at the same time you use the Cold Bath. It is also very serviceable in the Gout, by restoring the Use of lame Hands, Knees, Legs and Feet. It revives the Memory, clears the Brain from viscous Humours, and helps the Eyes, by drying up Rheums. It relieves sharpness of Urine, Strangury and Disury, if there is no large Stone or other stoppage in the urinary Passages. It corrects Acidity in any part of the Body; as in the Heart-burn, Belchings, Sourness at the Stomach, Gripes, Cholic, and *Borbarigos*. It opens the Breast and Lungs, cuts tough Flegm, promotes Expectoration, and has often been successful in the Cure of Blood-spitting, Hectic Fever, too great Heat and Dryness of the Skin and Body. But I would dissuade from the use of it, such as have a vehement Cough, raise up much tough Flegm, and are much worn out by a Consumption.

As to drinking the Waters, the same Dose is not to be prescribed to all, even tho' they are near the same Age, Strength and Distemper: But let them begin with a moderate Dose, as, three Pints, or two Quarts at first; and add to this, for three days after, a Glass or two more; which let be your fixt Quantity, provided it go readily off the Body; if not, let a Physician be consulted presently, who is a proper Judge of the Distemper, and this Water. As for my Patients, three Quarts apiece in a Forenoon is their common Dose, together with moderate Exercise, as ease Walking, Riding on Horse-back or in a Coach or Chariot, whereby the

Water is better distributed through the whole Body, mixt with the Blood, goes sooner off, and more effectually answers the design. I have, not seldom, seen several weak People, as well as strong, drink eight, twelve, or sixteen Pints apiece in a Forenoon; but never could see any such Gluttons reap more benefit than the moderate Drinkers: For certainly, a moderate quantity, (allowing a longer time to the Use of the Water) will answer all intents with more safety, and to better purpose. I have observed, that Cholerick People may drink a larger quantity with more benefit than others: And indeed, as they have a greater Heat, Thirst, quicker Circulation of the Blood, and sharper Humours than others, their Constitution seems to require.

The proper time to begin to drink, is, from half an Hour, to two Hours after Sun-rising, in *May, June, July, and August*, these being the properest Months in the Year, except in case of Necessity, and then, with due Care, they may be used at any time. They must be drunk upon an empty Stomach, except you take some preparatory Medicine before; then a short Walk betwixt that and the Waters is not amiss, to warm the Body, and procure the Water a readier Passage. Several weak People drink either all, or a part of their Dose in Bed; and we find that every whit answers as well, only they drink a smaller quantity. But Exercise, and the thin fresh Air contribute not a little to the Patients Recovery; and there is no finer, fresher Air in *England*, than at *Harigate*, as is generally and justly owned by all Strangers.

As to drinking this Water in the Afternoon, it must not be allowed in any great

which are much stronger here than at the Sea, because of the adherent Sulphur. This Place and the Forest were formerly so thick of Wood, that he was thought a cunning Fellow, that could readily find out those *Spaws*, tho' there is not now one Tree out of the Park.

This

great quantity (tho' it be the Custom at *Tunbridge*, *Astrop*, and other Chalybeate Springs;) for there is not a due time to digest the Waters before Supper: But there is no harm, if Persons of an hot Constitution drink a Pint of it between four and five a-clock; a Precedent not to be imitated by phlegmatic People, and such as have Rheums and Catarrhs. Such as are troubled with a Dryness of their Mouth and Throat in the Night, or Thirst which disturbs their Rest, may not only drink two or three Glasses of it in the Afternoon, but carry a Bottle of it to Bed, and drink it when they have occasion. Those also who labour under the Hyppo, Sand, Gravel, small Stones, or a Stoppage or Heat of Urine, may safely and advantageously drink a Pint of it in the Afternoon.

I have observed several Strangers here, who by hard Travel, hot Weather, Dust, and long Journies, have been seized with a violent Fever, which has requir'd Bleeding; then give this Water, with a little Syrup of Violets, and the Fever is carried off to admiration, by Urine, Sweat and gentle Laxatives; tho' the Patients have owned, that the like Fever (without this help) has formerly confined them near three Weeks to Bed.

It has also been query'd, whether the Use of this Water with Wine may not be a proper Drink for Dinner and Supper, instead of common Water? But I answer, that Water mixt with Wine, is too great a Diuretic, and hastens the Chyle out of the Stomach, before it is well prepar'd and digested. Hence the Kidnies strain it off hastily, and may sometimes leave such coarse Matter, as may occasion the Stone or Gravel in those parts; which falling into the Bladder, may quickly become too large to be expell'd by Urine, or

pass easily the *Urethra*, except timely prevented by fit Medicines. Such as chuse Water to their Wine, may be supplied from several good Springs of common Water.

As to what distance this Chalybeate Water may be carried from the Spring, without Loss of some of its Parts or Virtue; if it is taken up in the Night, bottled and cork'd well, it may be transported 14, 16, or 20 Miles; but if it is much heated in the Carriage, it loses much of its Virtue and Operation, by the Loss of its Volatile Spirit, and letting fall to the bottom some of its Minerals: Therefore, as Servants cannot be too cautious in carrying it away; so it's best drunk at the Spring: But for the sick and weak, which cannot, without danger, come to the *Spaw*, the water may be of service, especially if some Medicines be added to it proper for the Disease, and akin to the diminish'd or lost Parts.

In the last place, I shall here prescribe some general Remedies, which I have made use of with great success, to many infirm Persons; but select Medicines must be order'd, and given in particular Diseases, according to the present Symptoms and Necessity.

Take of Lenitive Electuary, *Diacatholicon*, of each one Ounce and half; Cream of Tartar, Pouder of Jalap, of each one Dram; Resin of Scamony pouder'd, eight Grains; fresh Syrup of Violets, four Drams and half; strong Cinamon-water, one Dram: Make an Electuary. Dose, from half an Ounce to an Ounce; Early in the Morning, for a Preparative before you begin to drink. And if the Day is fair, and the Air temperate, they may walk abroad, and drink of the *Spaw*.

This Water mixt with Ale, certainly makes the most intolerably nauseous Draught in nature. A Stranger to the trick would certainly call for an Attorney to make his Will, if not done before. Or, the Water put to working Ale,, puts an instant stop to its further Fermentation.

Spaw. The following is fitter for stronger Constitutions.

Take of the Electuaries *Diaphanicon* and *Diacatholicon*, of each one Ounce and half; Cream of Tartar, one Dram and half; Pouder of Jalap, one dram; Resin of Jalap, 26 grains; fresh Syrup of Damask-Roses and Violets, of each three drams; *Aqu. Mirabilis*, one dram and half. Prepare all, mix, and make an Electuary. Dose one ounce, or ten drams, drinking after it, within an Hour, two or three Pints of the Sulphur-water, and afterwards two or three Pints of the Sweet Spaw. Women with Child, and Children may use the following safely:

Take of the Magistral Syrup for Melancholy, one pound; purging Syrup of Apples, three ounces; *Miste*. Dose, one ounce before the Water, then two or three draughts of the Sweet Spaw after. Some may take, Syrup of Buckthorn, one ounce, mixt with the first draught of the Spaw-water. A Child may take, from half an ounce to an ounce of Syrup of Violets, mixt with several draughts of the *Spaw*; or fresh Syrup of Damask-Roses; or Syrup of Peach-Flowers, six drams; or Syrup of Rhubarb. Adults may swallow one or two of the following Pills at night, and as many in the morning: And if the Season is warm, he may drink of one, or both *Spaws* after, as his Physician sees proper.

Take of stomachic Pills with the Gums; Aloephangine Pills, of each half an ounce; Extract of *Rudius*, two drams;

Salt of Tartar and Wormwood, of each half a scruple; Resin of Scamony and Jalap, of each eight grains; Chymical Oils of Cinamon and Nutmeg, of each two drops; Syrup of Violets, enough to make a Mass of Pills. Or, let them take one or two of our *Spaw*-Pills (the Receipt whereof follows) at Bed-time, and as many in the Morning, and drink either *Spaw*, or Sulphur-water after.

Take Gum *Taccamabaca*, *Carrana*, Ammoniac, of each (dissolved in Vinegar of Squills) two drams; Salt of Wormwood, Salt of the Sulphur-Well, well purified, of each half an ounce; Root of Aromatic Reed, Juniper-Berries, Aloes-Wood, Cinamon, Mace, Cloves, Nutmeg, lesser Cardamom-seeds, Tops of dried Wormwood and Mint, of each two drams. Let the last ten be grossly poulder'd, and a fine Tincture drawn from them in two pounds of rectified Spirit of Wine. In the streined Liquor infuse Rhubarb and Agaric, of each one ounce and half; Sena one ounce; Resin of Scamony and Jalap, of each four drams; best succotrine Aloes, one pound. All these (except the last) being well poulder'd, and when the Aloes is dissolved, add Ponders of Mastic, Myrrh, Olibanum, of each two drams and half; Pouder of Saffron four drams; Balsam of Gilead and *Chili*, of each one dram and half; Galomel, two ounces. Mix all well: Let the superfluous Humidity exhale over warm Ashes, till they are reduced to a proper Consistence. This Mass of Pills carefully made, will commend it self, as well in the Use of the Waters, as without

tion. The Soil, out of which these Springs rise, is, first, Corn-mould; then a Marble Lime stone, so abraded by the Salt in the Water, that when dried, it swims in Water. There is also a Stratum of Plaster. These Sulphur-Waters lie pretty much in a Line from West

without them, against most Diseases incident to humane Bodies; being composed of the choicest Medicines to carry off all vicious Humours from the Body, with much Ease, and without Gripings. These I continually carry with me there, and find them answer the Expectation of both Physician and Patient.

Of the Sulphur, or Stinking Well.

Here are, and were, about twenty years ago, three Springs close together, very low, and scarce of Water, than all of them did not afford sufficient Water for drinking and bathing. Wherefore, for the greater Convenience of the Drinkers, I thought it convenient to take up the uppermost Spring, which is weakest, and lowest of them, and made a large Basen to contain several Hogheads of Water, and covered it with a large Stone, to preserve it from the Sun and Rain-water; and for a Week together we rammed its sides with Clay, to prevent other Springs from getting in. The Event answered Expectation: For we had a fresh Spring of much better and stronger Water, which afforded as much in one Hour now, as it did in twenty four before, more loaded with the Minerals than ever, and so of greater Efficacy for either Bathing or Drinking.

This Spring partakes of Sulphur, Vitriol, Nitre, Copper and Salt; all these lying in solutis Principiis in that Earth, which, if you dig up, you may separate. The Earth about these, and some other Spaws in Bogs, is black and bituminous, the surface whereof in hot Weather is candied over with a yellow scurf, which is perfect Brimstone: For, put in the Fire, it burns blue, and smells strong of Sul-

phur. You may also observe a Scum on the stagnant Sulphur-water; which carefully skimmed off with fine Paper, and dried in the Sun, burns blue in the Fire, and smells of Sulphur. When I took up the Basen of the upper Spring, composed of two Stones joined together, I found several Handfuls of fine Flowers of Brimstone, sticking to the under side of the Stones, which I gather'd, and presented to several Persons of Quality present. This was Conviction to a certain Author, who lately in Print confidently denied the Existence of Sulphur in this Water, but now retracts it heartily.

The next Ingredient is Vitriol, which you may gather above Ground at the Spring-side. Beside, I have often digg'd in the Bogg above (which is full of those Sulphur springs) and in dry Weather you may find several Globes or Marcasites tinged yellow with Copper, shining like Gold; which laid by in a Cellar, afford soft Efflorescences; which wipe off with a Feather, and lay them in their place again, and they will throw forth more of the same. Dissolve these in Rain-water, and you will have good Vitriol.

The third Ingredient is Nitre, which is in all Fat Earth, but especially in this black bituminous. The Ground both about those Springs, and of two little Hills by them, is full of a coarse Lime, as Pumice stone; the Rain-water, and that of the Springs having wash'd out its Salt, which may be seen and gather'd on the sides of those Hills.

The Fourth Principle is Copper, which is separable from the rest of the Minerals; but these glittering Globes, or Marcasites are tinged of a Gold-colour, plainly shews them to be gild with Copper; and the Taste of them is not unlike it: But the

West to East, on the North side of *Knareburgh Forest*, in the Parish of *Panal*, parted from *Knareburgh Parish* only by a small Brook, called *Sulphur-Well Beck*.

Vitriol and Nitre are mix'd, yielding a salt bitter Taste, with a smack of Copper.

The last Ingredient is Salt, distinguishable by its Taste and Brackishness; but the Inhabitants near the Wells, yearly, when the Company is gone, boil great quantities of the Water, and procure Salt from it, which is sold in the Country, and sent up to *London*. A Gallon of Water, either in a Drought, or hard Frost, yields one Ounce of Salt; but at other times it's less.

Now, to the Diseases wherein this Water is proper, and which we daily see it cure, in such as are regular, and comply with necessary Rules. Tho' it is very clear and transparent in a Glass, yet from the above Principles, it must be very saponaceous, cleansing and opening. Hence it is fit for carrying off all vicious Humours from the Intestines, as: slimy and mucous Matter; opens Obstructions of the Liver and other *Viscera*. And tho' it purges sharply, yet even during the Operation, the Drinker may perceive his Spirits raised; he is more chearful, active, and vigorous. It resists all corrupt Humours, creates a keen Stomach and quick Digestion. It cures the Scurvy better than all other Medicines. It's no less successful in a recent Dropsy, where the Lymphatics are not broke, nor the Waters extravasated, nor the *Viscera* tainted; and that by drinking, bathing and sweating. By frequent and long Experience, I have seen it help the Jaundice, tho' of many Years standing. It kills and expels all sorts of Worms, together with that Slime in the Bowels which is their Nest; wherein I have often found a round black Speck like Seed, which, I'm certain, they breed from, and which being evacuated, the Persons were entirely cured, or free from Worms many Years after. And tho' the Worms were carry'd

off, yet while the Slime and these Seeds continued, we could not promise a full Cure. It's alike effectual in the broad and round Worms, and *Ascarides*. Some of the last have had strange shap'd Heads of divers Colours, and sometimes in surprising Quantities; but then we found them link'd, glew'd, or join'd to a long Chain of Flegm, often above two Yards in length, as in *Sir W. Fenton's* and *Capr. Steninton's Cases*. But besides these three sorts, here are other strange Worms, or various Insects oftentimes expell'd, with monstrous Shapes and Heads, like a Dog or a Wolf; sometimes four Feet, two towards the Head, and two near the Tail, of a brown Colour. Some of the broad Worms were above two or three Yards long, and some of 'em at an Inch or two distance, joyned, and cover'd with small white Hair. It cured internal Ulcers both in the Neck of the Bladder and *Anus*, from a Venereal Cause, in a Gentleman of good Quality, who had spent his Relations much Money before he came to this Water. The like I have observ'd in several Cases of that loathsome Disease, wherein it gives Help and Cure both inwardly and outwardly, sooner, and with less trouble than the Methods heretofore used. It prevents the Attack, and if recent, cures several Diseases arising from the Scurvy; as, an Asthma, vertiginous Motions in the Head, *Scotomia*, Paralytical Distempers, slight Fits of an Apoplexy, a Phthisical Shortness of Breath. It relieves the Stomach, and if drunk first leisurely, to move ill Humors there, and afterwards quickly, it stirs up Vomiting, and frees it from much Flegm, Choler, and other sharp Humors that disturb the Animal Oeconomy.

In great Obstructions of the Bowels, in great and obstinate Obstructions of the Bowels and *Viscera*; Gripes, Flatulency, and much Pain; in plethoric and stegma-

ic Constitutions especially, it carries off much Flegm, Choler, and acid Humors, to a Wonder, warming and refreshing all those tender and membranous Parts, by gentle Heat. It is surprising to see what quantities, and with how much irregularity the Foresters, who flock thither in Multitudes, on Holidays, drink, contemning all Advice, and vying with one another who can drink most; yet no Complaint from all this. But we advise our Patients to drink only three or four Pints. Few drink three Quarts, only as their Stomachs can bear and digest it. Such as have cold Stomachs, and weak Digestion, I cause to begin with Sulphur-Water; and when that has operated, and open'd the first Passages, and clear'd them, then to the Sweet Spaw, and drink that as they find it agree with them, proportioning their Dose to their Strength and its easy Passage. But such as are of a hot and dry Constitution, let them begin with a Pint and half of the Sweet Spaw, then to the Sulphur-Well; for the Body requires some of the Water, to compensate the loss of its Fluids. And tho' hereby the Sulphur is not so quick in its Operation, yet it works more agreeably afterwards. But in general, for weak and infirm Persons, there is a great deal of care to be taken, both in preparing their Body for the Water, and putting them in a proper Regimen.

Now, as to the external Cures performed by this Water, they are so many and various, as scarce to be enumerated; only I shall give some short hints of what I have seen it do.

It's now thirty Years ago, since I set up first warm Bathing in this Water, and procured one such Vessel for a Pattern, as are used beyond Sea for that purpose; and now there are above twenty Bathing Houses kept here, with all necessary Conveniencies, and all full employed in the Season: And several, who have visited both the Bath in *Somersetshire*, and this, have freely owned, they have reap'd more Benefit from the last than the first. This Bath does much good in Aches, Pains, Bruises, Strains, Lameness in the Limbs, Weakness of the Back, from Scurvy, Cold

and Wet especially, for a Dropsy in the beginning thereof; for paralytic Pains and Weakness, if the Parts have not been long weakned, the Solids emaciated, and Spirits exhausted thereby. In this case, the Bath proves more effectual, if some suitable Plants be boiled in a little of the Sulphur-water, and mixt with the Bath; as, Sage, Angelica, Lavender, Sweet Marjoram, Fennel, with some warm Seeds and Berries. Neither would it be improper, after Bathing and Sweating, to apply to the Parts, Ointments or Liniments, with Chymical Oils and Spirits.

It is good in the Sciatica and Gout, Pains of Hands, Feet or Legs, strengthening and restoring the Parts. Bathers go into it moderately warm at first, and increase its Heat by degrees, as the Patient sweats: But weak Persons can neither bear it so hot, nor sweat so much as strong People; they ordinarily continue an Hour in it. Such as have Complaints or Aches in the Head or Neck, have some warm Sulphur-Water poured on the back part of their Head, before they come out of the Bath; and then the Parts are well rubb'd with a warm Cloth. They should not go into the Bath too hot at first: For it puts them into a violent Heat and Sweating, makes them faint and sick, that they are forc'd to come out, and so lose the Benefit of the Bath, if no greater Mischiefs. Neither should they go in with a full Stomach. If they bathe in a Morning, let them eat a little Gruel, or Broth, or a poach'd Egg, or something of light and easy Digestion, an hour or two before they go in; but if they dine, they must not go in for four hours after. Some prefer bathing at Night; and if they have eat a light Supper, and stay at the bathing House all Night, to prevent catching cold, they lose no time for drinking the Water next Morning. Having got the Sweating over by ten or eleven a'clock, then got up, had their Bed made, eaten some light Food, they may go to Rest till the Morning.

Thus finishes our Author, having referred us to a great many Observations, which are lost.

152. The Water of the first of these three Sulphur-Wells weighs seventy two Grains in a Pint heavier than common Water, and throws out 368 Pints in an Hour. The Spirits in the Thermometer subsided three Eighths of an Inch lower in it than in common Water.

The second, or middle Spring weighs only thirty two Grains in a Pint heavier, and the Spirits in the Thermometer subside only one Eighth of an Inch lower in it than in common Water, and afford twenty Pints of Water in an Hour.

The third Spring, or that next the East, tho' the first found, built and us'd, sends out forty nine Pints and an half of Water in an Hour, and weighs fifty eight Grains in a Pint heavier than common Water. The Spirits subside three eighths of an Inch more in it than in the Brook; which yet is a Spring which rises up a little above. Half a Crown laid in a Glass of this Water fresh, it became Jet-black in a quarter of an hour; twelve Drops of Solution of Gold in two Ounces of the Water, turn'd the first and third Wells black and thick; they presently crudled, and let fall a very large black sediment; and after four Hours standing, the Liquor above was perfectly clear. The Water of the second was a deep redish Black, was longer in crudling, and let fall less sediment. The Liquor above was greenish; but being uncertain whether this was the effect of the *Aqua fortis*, or Gold, I laid my Gold-Watch in a Tea-Saucer full of the Water, it presently turn'd green, crudled, and let fall a large sediment, as before. This Water mixt with Red Port-Wine, was first a fine diluted sparkling Red, then a fine Purple, next Morning a whitish Purple. Solution of Gold, four Drops made four Ounces of each of those Waters exceeding black; they presently let fall a black sediment, which at first hung on the bottom and sides of the Glasses, then rose up to the top in black Flakes, like Pieces of Bladder. The same it was with Solution of Silver, and also with Solution of Copper; only the Colour was a redish Brown. They were first of a beautiful deep Yellow, with Tincture of Nephritic Wood, then a whitish Yellow, then crudled redish Yellow with Solution of Sublimate. I tried the last Experiment the Summer after, and the Water was Jet-black. It was Milk-white with Spirits of Hartshorn, brownish red with Tincture of Rhubarb: It was black, crudled, and let fall a great sediment, with Solution of Sugar of Lead. It was white as Milk with Oil of Tartar, then crudled, and let fall a large white sediment.

sediment. The Liquor above was clear; but the Water of the third Well was black; as was also a Bottle of the same Water, when brought home, and kept eight Months; it still stunk at the Expiration of that time, tho' not so strong as at the Spring. It also was black with Gold, Silver, and Sugar of Lead Solutions. The Water at the Spring was first clear, then whitish, with Spirit of Vitriol. It was whitish clear, without Scum, Sediment, or Incrustation, with Spirit of Salt. It was a pale White with Syrup of Violets. They are all red with Tincture of Brazil Wood; a pale Yellow, but at the Eye a muddy light Brown, with Tincture of Logwood. Galls, Green Tea, Sumach, &c. only made it muddy, without the least purple Cast. This Water crudles Milk, and throws Soap into hard Flakes. A Gallon of the upper Well (or that commonly drunk) exhaled, left near two Ounces of Salt. A Gallon of the middle Well left half an Ounce of sediment. A Gallon of the lowest Well afforded about an Ounce and half of sediment. The sediment of the first contain'd near two scruples of Earth. The sediment of the second afforded seven scruples of Earth. The sediment of the third had seventeen Grains of Earth. The sediment of the first Well is to its Vehicle, as 1 to 64; the sediment of the second, as 1 to 279; the sediment of the third, to its Vehicle, as 1 to 125. These Salts, upon Crystalization, prov'd all Marine Salt only.

153. I examin'd these Waters again Aug. 1, 6, as I had done before; Oct. 6, 7 8, and discover'd no Variation: Then I distill'd three Gallons of the Water, and took only three Pints off; the last was as strong as the first, was a dark brown Colour, and stunk intolerably; it was black, and precipitated with Solutions of Silver, Copper, Sublimate, Oil of Tartar, and Sugar of Lead. The fresh Water kills Worms, or other Vermin in an Hoar or two. The black slimy Mud in the Stream, being dried, sends out much blue Smoak, a little Flame, and stinks intolerably on a red-hot Iron. The Mineral substance, or Concretions in the Bog strike Fire, burn blue, smok little, but fill the Room with a strong smell of Sulphur; seven scruples of it laid on a red-hot Iron, weigh'd only four afterward. Its Infusion precipitates not Solution of Silver; but is purple with Galls, Sumach and Green Tea, and a blackish Yellow with Tincture of Logwood; a muddy White, with Solution of Sublimate and Sugar of Lead. A Piece of the Shale here, powder'd, and infused in Water, in a close Vessel some hours, turned Solution of Silver white; it instantly crudled and precipitated. With Solution of Sublimate and Sugar of Lead

Lead, it was Pearl; a muddy white, with Oil of Tartar and Spirit of Hartshorn; a light Purple, with Galls, after a few Hours standing bluish Green, with Syrup of Violets, &c. The Water of the *Sulphur-Well* close corked up in a Phial eighteen Hours, in four Hours became white, lost nothing of its smell. This Phial set in a Pan of Water, till it was scalding-hot, had still its former smell; put in again till the Water boild, it was still the same, tho' it had thrown its Cork thrice, with prodigious Force and Crack. The Bottle stood an Hour and quarter in the Pan, till the Water in the last was almost exhal'd; then I took it out, and pour'd it on Solution of Silver; it became of a dark colour, like thick muddy Ale: It had a most abominable smell of an half rotten human Carcass, having lost its natural Odour. The Salt of this Water laid on a red-hot Iron, crackles, but stinks not.

154. *Knaresburgh Sulphur Well* is of a dark blue Colour when taken up; but turns white, after seven or eight hours standing; it smells and tastes strong of Sulphur, which it loses by standing nine hours in an open Vessel. A Gallon of it exhaled, left six scruples of sediment; which is to the Vehicle, as 1 to 512. Fourteen Pints of this sediment was Earth. The Water, with Solution of Silver, is a dark, or muddy White; then lets fall a dark sediment, like a Bit of thin Bladder. With Tincture of Rhubarb it's a deep redish Brown; with Solution of Sublimate, it's first a dark White, then bluish Clear white sediment; near the same, with Sugar of Lead; Pearl, with Oil of Tartar; yellowish, with Spirit of *Sal Armoniac*; a deep Brown with Tincture of Logwood; yellow, with Tincture of Galls, &c. Its Salt was wholly Marine; its Crystals you have represented exactly.

155. *Bilton-Spaw* in the Park, is a strong Sulphur, leaves a prodigious quantity of white Sludge in its stream. It turns Solution of Silver, first of a strong Beer colour; then it turns white, and throws down much white sediment. Galls alter'd it not; four Gallons of it exhal'd, left half an Ounce of sediment; which is to the Vehicle, as 1 to 1024. This sediment contained one sixth of Earth; the Salt dissolved, and set to crystallize, was also Marine only. This sediment, when all the Water was exhal'd, smell'd strong of Horse-Parsley. There was also a very cold Well at *Harrigate*, famed for sore Eyes. This, Dr. *Neal* of *Doncaster* turned into a very good Cold Bath, with very good Conveniencies and Accommodations for Strangers. It makes the Spirits in the Thermometer subside six eighths of an Inch lower

lower than in common Water, in *October* and *March*, when I tried it. There are also several ouzing Springs in a Marshy Clay-Ground, below *Harrigate*, of a saltish Taste: These, upon Trial, afford only common Salt, without either Sulphur or Vitriol.

157. In my Return from *Whitby*, nine Miles on this side, and a Mile and half from *Saltergate*, we find *Newton-Dale* petrifying cold Spring. It's exceeding astringent, and a much rapider Stream than *Knaresburgh* dropping Well. It falls from the Mountains above, in a subterranean Current, discharges it self here, petrifies every thing in its Course with various and beautiful Incrustations and Figures (being truly coarse *Ostacoles*;) effectually cures Loosnesses, or Hemorrhages of any kind, in Man or Beast. It quickly and wonderfully restores weakned, and even beginning distorted Joints and Limbs, by bathing in it.

158. Seven Miles from *Harrigate*, and two Miles from *Rippon*, is *Oldfield-Spaw*. It lies between two Hills, near an old Abbey, in a very Romantic situation, resembling *Matlock*, within seven or eight Yards of a Brook-side, has been known about thirty six Years; it was discover'd, in digging the Ground-work of a House: In digging, you first come to a blue Clay a Yard thick; then to a blue Shale two Yards thick; then to a Clay again a Yard and half thick; and lastly, a sandy Gravel: But none of these are the Impregnators of the Waters; these are still out of Ken. A Quart or two of the Waters drunk hastily, vomits; and four or five Quarts of it work off by Stool and Urine. The Spring is always of the same height, and is neither affected by Rain nor Drought; only it boils up impetuously with a great noise against Change of Weather; but throws forth no more Water. The Water poured into a Glass, rises up in Rows like strings of Beads, and besets the Glass-sides with Bubbles. It rises up South-East, in a very hilly Country, dyes its Basen redish, turns Oak-Leaves, Grass, old Rags, &c. white. Twelve Pints of it boiled away, left thirteen scruples of brownish white sediment, brackish salt, crackled, and flew about on a red-hot Iron; precipitated Solution of Silver, fermented strongly with Oil of Vitriol, and turned Syrup of Violets green. This sediment left half a dram, or thirty grains of Earth, upon solution and filtration. The Salt was wholly Marine, without mixture. Thus, the Sediment, or fixt-Parts in this, is to the Vehicle, as 1 to 365 $\frac{1}{2}$. The Water, with Tincture of Nephritic Wood, was a yellowish Clear at top, and thick at bottom; a pale Yellow, with Tincture of Rhubarb; clear, and a white sediment, with

with Solution of Sublimate it was blackish, and precipitated a brown sediment, with Solution of Sugar of Lead; clear at top, and white at bottom, with Oil of Tartar and Spirit of Hartshorn. The acid Spirits affected it not; nor did Galls, Green Tea or *Sumach*.

159. The *Filab-Spaw* (about six Miles from *Scarburgh*) belongs properly to the Class of Purging Chalybeates: Yet because of its great Quantity, and Genus of Salt, I have reserved it to this Place. It lies half a Mile North of the Town, within ten Yards of the Top of a frightful Precipice, about 150 Yards high, which bounds the swelling Waves. It rises up full East, throws out eight Gallons of Water in an hour. It is of a very salt Chalybeate Taste, smells Inky, is covered all the Summer with a red scum. Its Basin and Stream are full of Oker. It's a perennial unaltering Spring, being the same in all weather and seasons. It's a whitish Water, and very full of the Mineral Spirit. It's not known when, or by whom it was discovered. The common People drink of it a Gallon in a Morning; It's a powerful Purgative and Diuretic. It instantly precipitates Solution of Silver; it's bluish with Solution of Copper, turns cloudy, and lets fall a blue sediment; it's whitish at first with Tincture of Nephritic Wood; but next Morning it was of a deep Green, and cruddled: With Tincture of Rhubarb, it was redish, or a redish Yellow; next Morning it was full of Clouds, and had precipitated: With Solution of Sublimate, whitish; with Solution of Sugar of Lead, first white, then let fall much white Powder: With Oil of Tartar and Spirit of Hartshorn, whitish, on mixing; the next Day both had much white sediment. The acid Spirits fermented with it, and made it of a fine bluish Clear; green, with Syrup of Violets: Tinctures of Logwood, Galls and *Sumach* turned it of a beautiful Red; Brandy turned it purplish. Two Gallons of it exhaled, left four Ounces of sediment, which instantly precipitated Solution of Silver; turned Syrup of Violets green; made a violent Ebullition with much smoke, with Oil of Vitriol; its Solution was green. This sediment afforded two drams and ten grains of Earth; the rest was all Salt; which, upon Crystallization, was wholly Marine Salt. The sediment in this *Spaw* is to its Vehicle, as 1 to 67.

160. Upper *Normanby Sulphur Spaw*, four Miles from *Pickering*. It's said to purge gently. About 50 Years ago, it was a Bogg jult on the Brink of the River: It rises up in a Bank of Clay, about an hundred Yards East of the Village. Its Bason and Stream are black as Coal; but Cloaths, Sticks, &c. fallen into it, white. The Water stinks intolerably; and by the help of a moderate Wind, may be smelt half a Mile off. The Water turns Jet black thick, crudles, and lets fall a sediment, with Solutions of Silver, Sublimate, Copper and Sugar of Lead: Oil of Tartar causes a little Precipitation; Galls alter it not: It's very red with Tincture of Logwood. It is the beautifullest, clearest Water I ever saw, sparkles like *Champaigne* when poured out. The Spring affords the same quantity of Water Summer and Winter, about fixty Gallons in an Hour, and is always covered with a blue scum. The River into which it discharges it self, is strangely loaded with Oker in all its Stream, especially about the *Middleton* and *Black Park Spaws*. Four Gallons of this Sulphur-Water exhaled, left two Drams of sediment, of a greyish white Colour and pungent Taste. But tho' the ingenious *Tho Robinson, Esq;* exhaled twice of it afterwards, we never had a sixth part of the sediment. It's very strong of the Sulphur and Mineral Spirit, but weak of the fixt Parts, the last being to the Vehicle, as 1 to 2048. The *Lixivium* of its Salt set by to crySTALLIZE, affords about two Parts *Nitre*, and a third Part common Salt. Nether *Normanby Spaw* is a Chalybeate; a Gallon of it exhaled, left ten Grains of sediment, which was brackish Salt, crackled, and flew about on a red-hot Iron; fermented strongly with Spirit and Oil of Vitriol, instantly precipitated Solution of Silver and turned Syrup of Violets green.

161. The next *Sulphur-Water* of Note after *Harrigate*, is *Croft-Spaw*, within the Borders of *Yorkshire*, and on the Confines of the Bishoprick of *Durham*, very near *Darkington*. This has merited a great Reputation, and is much frequented in the Season, has done many very eminent Cures, both by Bathing and Drinking. It's in the Parish of *Croft*, about half a Mile from the Church, is in a charming situation, rises up South-East, was first taken notice of, and brought into Fame by *Sir William* —, in whose Lordship it laid. It's a fine clear sparkling Water, smells strong of *Sulphur*, nor does its Stream rise or fall by Rain or Drought. The Place lies all upon Lime-stone; every thing in its Course becomes white with redish specks between: It's drunk from Four Pints to Nine; it crudles Milk and Soap. It's a bluish White with Solution of Silver,

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a fine

a fine bright Yellow, with Tincture of Rhubarb; whitish, with Solution of Sublimate; white, with Solution of Sugar of Lead; white, with Oil of Tartar and Spirit of Hartshorn; Galls alter it not: It is a redish Yellow, with Tincture of Logwood. Nine Quarts of it exhaled, left twenty scruples of sediment, very white, and smell'd strong of Hawthorn-Flowers. This sediment afforded six scruples of Salt: so that the Sediment is to the Vehicle, as 1 to 354 and a half. This Salt dissolv'd, and set to crystallize, projected about two Parts Nitre, and a third Part common Salt. This Place deserves greater Retort, having done several great Cures, as well by Bathing as Drinking.

Broughton-Spaw, near the House of ——— *Tempest*, Esq. It rises out of the North side of a gentle Ascent, under a Hedge, upon the Left-hand in the Road, side from *Skipton* to *Coln* in *Lancashire*. It makes Leaves of Trees, Moss, &c. red, and its Basin and whole Course Raven-black: It makes Silver first like Copper, then black; Copper it turns presently black. The Spring lays the Spirits in the Thermometer three Eighths of an Inch below common Water. It's of a whitish Colour. About ten Yards North-West of this, on the other side of the High-way, is an ouzing Spring, which leaves much Oker on the Earth's surface. It's very clear, tastes Vitriolic, smells Inky, and strikes Purple with Galls, *Sumach* and Green Tea. Therefore, were there proper Care taken, here might be a Chalybeate. A Quart of the *Sulphur-Spaw* exhal'd, left a Dram of sediment, fifteen Grains whereof was Earth. This Salt dissolv'd, and set to crystallize, afforded very beautiful Crystals of Nitre above, and Marine Salt below; there was more of the last than the first. Here the Sediment is to the Vehicle, as 1 to 256. These Experiments were made in *October*. In *July* following, I exhal'd again three Gallons of it, and there remained only seven Drams of sediment, four scruples and a half whereof was Earth. A Phial Bottle fill'd a third part full of this Water, and set in the Pan of cold Water we were about to exhale, we took it out when the Water began to boil, poured some of it on ten Drops of Solution of Silver, it crudled, and was of a dark whitish Colour. The same it did when tried after the Water had boiled a considerable time; but upon a third Trial, the Mixture was perfectly white, all the *Sulphur* being exhal'd.

162. A little Mile from *Broughton*, is *Crickle-Spaw*, which rises up about six Yards within a Hedge, at the bottom and West side of a small Hill, whose Perpendicular is not above seven or eight Yards, and at thirty Yards distance from a Morass. In Rainy Weather the

Spaw

Spaw is fill'd up with fresh Water out of a Drain close by it in the Meadow. It's a clear, fine, strongly fetid Water; it turns Silver black in a Minute. Its Basin and the Earth in its Course are shining black; Rags, Leaves, Grass, &c. are very white in it. Below this *Spaw* is a small River in the Meadow; from its bottom spring up a great many other strong Sulphur Waters, six or seven whereof I counted. They discover themselves in the River, 1. From the exceeding Blackness of the Water. 2. From the white sulphureous Matter they leave on Sticks, Straw, Grass, &c. All these Springs crudle Soap and Milk. A Quart of this *Spaw* exhaled, left four scruples of sediment, twelve grains whereof was Earth. The Salt dissolved, and set to crystallize, was near one half Marine Salt, the rest Nitre. A little South-East of this, in a small Ditch, under a Ridge on the other side of the River, is a Chalybeate never known or noticed before, and wants only a Place making for a Receptacle. Half a Grain of Powder of Galls struck half a Pint of it a deep purple Colour instantly. This rises North from the Foot of another little Hill, not twenty Yards from the River-side. The sediment of this Sulphur-Well is to its Vehicle, as 1 to 192. Three Gallons of *Cricklee-Spaw* exhal'd in July following, left an Ounce of sediment, three scruples and a half whereof was Earth.

163. *Skipton* Old Sulphur-Well neither crudles Soap nor Milk. Its Sulphur is little and volatile, being mostly lost between the *Spaw* and the Town, tho' the Bottles were close corked: It made the Brass Pan wherein it was exhaled, very blue above the Water. Three Pirts of this Water exhaled, left half a dram of sediment, nine whereof was Earth, the rest Nitre. *Cricklee*, *Broughton* and *Skipton* New Sulphur-Wells compared, were thus, after they had stood all Night with the Mixtures in the Glasses: The first, with Solution of Silver, was first Ink-black, and rose up in strings of little Bubbles like Beads; then it crudled, was clear at top, and had a black Pellicle sticking to the bottom and sides of the Glass: The second was the same, only yellow at top instead of clear: The third was very clear, only had a small Wool, like sediment, at bottom. The same it was with Solution of Copper put to them; only the last was a sky blue without sediment. With Tincture of Nephritic Wood, the first and second were of a dark Pearl, and very muddy; the third very bluish. With Tincture of Rhubarb, the first and second were a deep Brown, with a yellowish Cast, and muddy; the third, a deep brownish Red and clear. With Solution of Sublimate, the first two were whitish,

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had a Pellicle on their surface, and a pretty large sediment at bottom; the last, a bluish White without sediment. With Solution of Sugar of Lead, the first two were Ink-black, and let fall sediments of the same colour, the third was clear; with Oil of Tartar, the two first black with some sediment. The third, a faint White. With Syrup of Violets, all three were greenish; with Tincture of Logwood, they were of a dark blackish Brown; with Tincture of Galls and Sumach, they were of a whitish Clay-colour.

164. *Wigglesworth-Spaw*, in the Parish of *Long Preston*, in the Estate of *Tho. Waddle*, Esq;. It has been used time out of mind. Rains and Drought make no Alteration on it. The Country-people drink four or five Pints of it to vomit them, and six or seven to purge them. The Water is very black, smells strong of Sulphur, and has a very weak stream; bubbles not, but springs up, is always cover'd with a white scum; dyes Leaves, Grass, Roots or Sticks white. It rises out at the Foot of a Hill; it's upon the Greet-stone soil, and a little way off is Lime-stone. It tastes salt, yet lathers with Soap, and crudles not Milk. A Phial-Glass third part full of the Water, well cork'd, and ty'd down, and set in the Water we were about to exhale, when it began to boil, we took it out, and poured some of the Water on Solution of Silver, which it turn'd black, and crudled. It was corked again, and set in the boiling Water; let it stand half an hour; Solution of Silver still turn'd it black. It was corked up, and set in the boiling Water a third time for half an hour; then taken out and tried, but was not black as before, and caused little crudling. The last, however, stood all Night; the Precipitation was of a black Colour, the Water above was clear. The fresh Water, with Solution of Silver, is a brownish Black, crudles, and lets fall a sediment. It's black with Solution of Copper, Sugar of Lead and Oil of Tartar; it's a fine bright Yellow, with Tincture of Rhubarb; white at bottom, yellow in the middle, and clear at top, with Solution of Sublimate; it's a light Blue, with Syrup of Violets; a light Red, with Tincture of *Brasl*-Wood; a dark Red, with Tincture of Logwood; Clayie whitish, with Tincture of Galls, &c. Three Gallons and a half of it exhal'd, left seven Drams of sediment, six scruples and a half whereof was black Earth, the rest was a Salt *sui generis*. A Nitre it is, but of what kind, I leave the Reader to judge, from the Figure of its Crystals.

155. *Ridmer-Spaw*, in the Parish of *Wensley* in *Wensdale*. It lies half a Mile from *Ridmer*, at the bottom of a Hill close by the River-side. It's a weak stream, boils up perpetually, like a boiling Pot; is always at the same speed, neither increases nor decreases by Rain nor Drought; makes its Basin; and any thing that falls into it, white. The Earth, in its whole Course, is a shining Black. It's a clear Water, and has a Bath about two Yards from it. In making the Bath, they found a dead Man's Bones. Neither Memory nor Tradition tell when, or by whom this *Spaw* was first discover'd. The Water sits very light on the Stomach, and goes off very quickly by Urine. It rises out of a Gravel Four Yards thick; and under that, is a blue Clay three or four Fathoms thick. At a little distance from it, are many Lead-Mines; it tastes not saltish. With Solution of Silver it is a dark Pearl; with Tincture of Nephritic Wood, yellow; with Solution of Sublimate, whitish; with Solution of Sugar of Lead, Milk-white; with Oil of Tartar and Spirit of Hartshorn, a pale Yellow; with Syrup of Violets, bluish; with Tincture of *Brasil* Wood, deep Red; with Tincture of Logwood, Crimson-Red; with Tincture of Galls, whitish. It has done several notable Cures in the Rickets, Scurvy, Lameness, Rheumatism, &c. by drinking and bathing in it. Nine Quarts of it exhaled, left of sediment Four Drams and a half; Earth, One Dram, eight Grains.

166. There is a weak inconsiderable *Sulphur-Water* in the midst of a small Valley, about a Mile from *Leeds*, and half a Mile from *Woodhouse-carr*. It is much out of order, and is of little use at present, except when the Croppers have got an over-Dose at Night, it takes off its Effects next Morning. Three half-Pints of it afforded Four Grains of *Marine Salt*. But,

167. We meet with one of much greater Note, at *Askeron*, five Miles from *Doncaster*, in *Campfel*-Parish, seven Miles from *Pontefract*. It is exceeding clear Water: It has a fine Stone-Basin, and is enclosed by a round Walk. Its stream is full of white thick Sludge, which ropes like a Decoction of *Althæa*. It smells and tastes very strong of *Sulphur*: It crudles Soap and Milk, turns Silver black, Brass, a blue Copper Colour. It retained its *Sulphur*-smell to a third degree of Heat. It becomes muddy, and crudles in boiling. It is a very diuretic light Water. The Farmers find it of notable service to them in curing chafed Feet, Saddle galling, Horses or Oxen galled in the Yoke, or by Loading, &c. mangy Dogs, scabb'd Horses, &c. It has done some notable Cures in inveterate strumous and other Ulcers,

Ulcers, Scab, Leprosy, &c. It's muddy white, with Solution of Silver; a clear sky-Blue, with Tincture of Verdigrease; light Yellow, with Tincture of Rhubarb: It's first white, then crudles, and lets fall a large brownish sediment, with Sugar of Lead; with Oil of Tartar and Spirit of Hartshorn, it is whitish, crudles, and lets fall much sediment. It makes a strong Ebullition, with the acid Spirits; with Tincture of Logwood, a beautiful deep Red; with Tincture of Galls, a muddy White. Five Quarts of it exhal'd, left three Drams of white sparkling sediment, a Dram whereof was a fine Salt, which crackled on a hot Iron; turned Syrup of Violets green; fermented little with the acid Spirits, but struck the Nose with a pungent smell. The rest of the Salt dissolved, and set to crystallize, projected very fine Crystals of Nitre and Marine Salt; the last was the largest. The sediment here, is to the Water, as 1 to 426 $\frac{1}{2}$; the Earth to the Salt, as 2 to 1.

This *Spaw* is within a few Yards of *Askeron-Pool* side, the Water whereof is very hard, crudles Soap into hard Flakes, yet bleaches exceeding fine, stinks in Summer, abounds with Pike, Perch &c. It has several profound Pits in it, the Depth whereof are not known. It is constantly supplied with Water from these Pits; never is less in the greatest Drought, nor overflows in the greatest Rain, except the Mill-Dam below is stopt up with Sludge and Grass. The Soil on one side is all Lime-stone; on the other side, a white Clay half a Foot deep, and below that, a very fine white Sand.

168. Near *Catcliff*, three Miles from *Ratheram*, and the same Distance from *Sheffield*, is a very fine clear Spring, which smells faintly of *Sulphur*. Galls alter it not; Tincture of Rhubarb makes it of a Golden Colour. It's first blue, then green, with Syrup of Violets; Oil of Tartar and Spirit of Hartshorn scarce alter it; acid Spirits change it not; Tincture of Nephritic Wood caused a small separation. Three Gallons of it exhal'd, left five scruples of sediment, Forty four Grains whereof was a white Earth. This sediment is to its Vehicle, as 1 to 1843 $\frac{1}{2}$.

169. *Shuttlewood-Spaw*, on the Common, between *Balsaver* and *Romeley*, rises up Westward, out of a whitish Clay and Free-stone; and not far off, are Iron-stone and Coal, and at a little distance, Lime-stone. But our Water is oblig'd to none of the three last for its Principles, being impregnated only with a little *Sulphur* and Marine Salt. Sixteen Pints of this Water exhal'd, left half an Ounce of very white sediment, a 24th Part whereof was Earth. The sediment of this

this Water is to its Vehicle, as 1 to 512. The Salt dissolved, and set to crystallize, was wholly Marine. However, this Spaw has been very successful in curing pimpled Faces, Eruptions on the Skin, old Ulcers, Strangury; and by bathing in it, Lameness, Weakness of the Joints. Scab &c. It is now made very convenient, the charitably dispos'd Mr Ch. Basseldine of Clown having put down a fine small Bason, enclosed the Spring, and made a Bath below, into which the Bason empties it self, at his own Expences. The Water crudles Soap in a Minute; the Pidgeons about come to drink of it.

170. A Mile from *Dransfeld* is *Cawley-Sulphur-Well*. It is a very clear Water whilst in the Bason fresh; but when stagnant, and in its slow Course, is blackish, and yet it turns every extraneous Body both in its Bason and Stream, very white. It is a pale bluish White with Solution of Silver; then leaves a purplish Incrustation on the sides and bottom of the Glas. It is first a muddy Clay colour with Tincture of Galls, then turns green throughout; a deep redish Brown with Tincture of Logwood. Three Pints and a half of it exhaled, left of a white, pungent, saline sediment, seventeen Grains, Four whereof was Earth; the rest, being crystallized, was Nitre only.

171. Near *Keddleston*, the Seat of the Honourable Sir *Nathanael Carson*, three Miles from *Derby*, in the middle of the Park, is the strongest *Sulphur-Water* in *Derbyshire*. It has a very good Bason or Receptacle, a Foot and half wide, and two Foot long. At its side are Flages laid, three Foot wide, and five Foot long, with a small Gutter in the middle for the Water to empty it self into a very good Bath six Foot long three Foot wide, and three Foot deep, paved at bottom and walled with good smooth Free-stone, and Seats by the drinking Water for twelve or sixteen People. The drinking Water is exceeding clear, but stinks intolerably; makes Silver presently a black Copper-colour. The stagnant Water is blackish; it alters not with Solution of Gold; but turns a blackish Brown, crudles, and lets fall much sediment with Solution of Silver; a white Clear, with Solution of Sublimate; a dark Clay-colour, crudles, and lets fall a large sediment, with Solution of Sugar of Lead; blackish, and lets fall a black sediment with Oil of Tartar; a deep Violet, with Syrup of Cloves; red, with Tinctures of *Brazil* and Logwood; a deep Sack-colour, with Tinctures of Galls and *Sumach*. In twenty four Hours its smell was quite gone, tho, the Bottle was well corked. This Water gives Cloaths washed in it, a redish Colour, as *Quarndon* gives them a black. Eight Pints of this Water exhaled, left two scruples

ples of sediment, twenty one Grains whereof was a dark brownish Earth, the rest Salt; which dissolv'd, and set to crystallize, was wholly Marine Salt. Here the Sediment is to the Vehicle, as 1 to 1536. Hence its greatest Virtue lies in its volatile Parts; and it has done many surprising Cures in Worms, Pains of the stomach, old Ulcers, Eruptions on the Skin, King's Evil, Lameness, Swellings, Weakness of the Joynts, fix'd and wandring Pains, &c by drinking, and bathing in it.

172. *Wirksworth* black Sulphur-Water is famous, not only for Cutaneous Disorders, but also for Rheums of the Eyes, and scrophulous Disorders thereof. It is the weakest of all the Sulphur-springs I have seen; lies at the South End of the Town, near the Warm Brook, within a Stone-Fence, on the Right Hand from this to *Derby*. Its Water is very black: The Soil is first Corn-Mould, then Shale and Earth mixt; 3. Shale; 4. Shale and Spar mixt. About an hundred Yards higher is a Vein of *Brazil* (which is chiefly Marcasite of Sulphur) three Yards and half broad and very thick, lying in shale, as its Mother. These two produce this Spring which alters not Solution of Gold; is a bluish Clear, with Solution of Silver; has a variegated scum at top, white, and a white Powder at bottom, with Solution of Sublimate; whitish Clear, with a redish Dust incrustated on the Glass with Solution of Sugar of Lead; very clear, with a grey Powder, with Oil of Tartar; slight Purple, with Tincture of Logwood; a deep Blue, with a Crust on the Glass-sides of the same Colour, with Tincture of Galls; a deep opaque Blue, with Green Tea. Twelve Pints of this Water exhaled, left sixty Grains of sediment, thirty four whereof was black Earth; the rest dissolved, and set to crystallize, projected Crystals of fine Nitre only. This is the first Sulphur-Water we have met with that contains a Load of Vitriol, with its other Ingredients. This sediment is to the Water, as 1 to 1536. It is also the only Sulphur-Water which contains pure Nitre only.

These are all the Sulphur-Waters in *Derbyshire* which I have heard of. I met with none in *Lincolnshire*, and *Nottinghamshire*; and these mentioned, are only a few of those in *Yorkshire*: The rest, as they seem of smaller Note, because perhaps less known, we have not yet had an Opportunity to examine, and therefore shall suspend our Informations of them at present.

175. Come we next to a Water of a very different kind, viz. *Ki-malton-Spaw* in *Nottinghamshire*. It lies in a small Close, on the Right Hand, at the West End of this long Village. It is a clear, pleasant, cooling, saltish-tasted Water, with a weak Stream. With Solution of Silver it's first blackish, then white, and presently lets fall a small white sediment. Tinctures of Verdigrease and Nephritic Wood, Solution of Sublimate, and the acid Spirits alter'd not. It is very white and thick with Solution of Sugar of Lead; it's white, crudles presently, and lets fall much white sediment, with Oil of Tartar and Spirit of Hartshorn; it is a beautiful light Red, with Tincture of Logwood. I could discover nothing of the Chalybeate in it, when brought to me at *Screaton*; whether it has at the Spring-head, or not, I cannot tell. Eighteen Pints of it exhal'd, left near an Ounce of beautiful white sediment, six scruples and a half whereof was a most alkaline white Earth; the rest Salt, which dissolved, and set to crystallize, was the purest, cleanest Nitre of any I had before met with. This sediment is to the Water, as 1 to 288. Hence it purges when drank plentifully.

176. *Ichley-Spaw* springs out of the middle of a Mountain, a Mile high, and consists chiefly of Lime stone and Free-stone. The Water is very clear, brisk and sparkling; has no taste, colour nor smell different from the common Water, is of the same weight. Its Bason and Course are of no other Dye than that of a common Spring. About thirty five Years ago, there were a House and a Bath built, about a Furlong below the original Spring, which Spring was brought down in Stone-Pipes. The first Spring, near the top of the Hill was very weak and small; this, very large and strong; whereby there appears to be a large Mixture of other Springs with this: since which time, it has fallen much short of its former great success. Twenty Yards above the drinking Well (over which is built a small House of a Yard square on the inside) they have cut thro' an original Spring of common Water. There are several old Lime-Kilns a little above this. The Water is first whitish, then blackish Purple, with Solution of Silver; it's very clear, and has a purplish Pellicle, with Solution of Sublimate; it was first white, then clear in the middle, and a white Mucus at the sides and bottom of the Glass, with Solution of Sugar of Lead; very clear, with Oil of Tartar; whitish, with Spirit of Hartshorn; and the same as common Water, with all the other Tryals. Five Pints of this Liquor exhaled left

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seven Grains of sediment, the Salt whereof dissolved in distilled Water, turned Solution of Silver purple; was white with Spirit of Hartshorn: Therefore tho' this Water is of the greatest Esteem and Repute of any in the North of *England*; in the King's Evil and other old Ulcers; yet it derives these Effects neither from its fixt nor volatile Parts; but wholly from the Coldness and Purity of the Element, its drying nature from the Lime-stone it washes, tho' a great part of it comes from blue Clay:

n75. From the whole Water of this Class, observe we, 1. That since they are so very clear when taken up, but in a few hours become white and muddy; and when carried or kept, are of a more disagreeable Taste, nauseous to the Stomach of the Drinker, are slower of Digestion and Discharge, produce worse symptoms, answer not the same end, nor have the same good Effects, are heavier, less brisk, invigorate not the Body; 'tis plain, I say, from all those Alterations and Differences between the Water drank fresh at the Spring, and when carried at a distance, or kept, that this Class also contains a Mineral Spirit, which, in common with other Spirits, has a very great Volatility; and disposition to fly off, as is incapable of being preserved or retained by such Vessels as keep other Spirits of the subtilest sort, as of Hartshorn, *Sal Armoniac*, &c. Wherefore the Particles of those Spirits (tho' consisting of Matter) must be smaller than the Pores of the Glass, and smaller than those of *Sal Armoniac*; and thereby upon Agitation or Motion, or on its Ascension in the Water, and mixing with the little included Air, it makes its escape. The Air being Elastic, this Mineral Spirit must be the same: For being wash'd off from the Minerals in the *strata* of Earth by the Water, it's wrapp'd up in the Particles of Air, is mixt and suspended with it in the Element, so as either upon the Motion, or Diminution of the Air, they get disentangl'd and set at liberty; its Mineral being the slightest Parts of such Minerals, Metals, or Fossils, as are dissolvable in Water: Therefore tho' a material substance, yet very different from the Air; yea, as different as the Vehicle which brings it.

I take not this Spirit to be a Portion of the universal Spirit, which has its principal seat in Sulphur: For besides the Laxness, Indefiniteness, and Insignificancy of the Expression; were there any thing in it, such Minerals and Fossils as abound most with Sulphur (wherein this Spirit is chiefly said to reside, and keep Court) should certainly be most spirituous, and especially Sulphur-Waters; which holds not always: For we often find Chalybeates more spirituous than several Sulphur-

phur-Waters : But this Spirit we look upon to be only the minuted, dissolv'd, or abraded, separable, loose Part.cles of Minerals, Metals and Fossils, together with their proper included Air, so exceeding small, that they are lighter than the common Water, which washes or rubs them off ; and if we know the dissolvable Minerals any Water washes, we also know what this Spirit is, tho' not, perhaps, the exact Parts of its Composition, where there happen to be several dissolvable substances in the road at once. The Quantity of this Spirit impregnating these Waters, will be, 1. According to the Plenty, Dissolubility, and Separability of the Materials in the Water's Course. 2. According to the more intense or remiss Ebullition or Action of those Parts between themselves on their Mixture, or on the Water. 3. According to the Disposition of the Water, whether it be hard or soft ; whether its Interstices be previously loaded with other Materials of Earth, Stone, Salts, &c. whether the Materials previously in the Water tend to encourage or check the Action of the dissolvable and commiscible Materials upon one another. Some, to make the thing more plausible, and go better down, tell us, that these Minerals are only *in fieri*, or Embryo, and so mix with the Waters : but this is a Jest. Are these Minerals still to be in a fluid state, and never arrive at a fixt or solid form ? The Bath-Waters have been known and used above two thousand Years : They are as richly impregnated now as then, are as efficacious in their Operation as ever, and have all their impregnating Minerals run all this while in a liquid form ? If so, sure, they will never be fixt. Again, supposing them in a state of Fluidity, is Water by any means a suitable Vehicle for them to mix with, and be supported by ? Will not their superior Gravity, not to add, their attractive Force, cause them quickly to subside, and separate from the Vehicle ? We see Chalybeate Waters deposit their Oker, and will strike no longer with Galls. Nor will Water support Metals dissolved in *Aqua fortis*. Others object, that if Mineral Waters were impregnated by a Dissolution and Mixture of some part of the Minerals ; were the subterranean Cavities never so well stored with these Minerals, they would in time be wholly wash'd away and spent. But this is only trifling : For how inconceivably small a quantity of the Mineral Substance is requisite to impregnate a great quantity of Water, is visible to such as have tried how few Grains of Vitriol dissolved in a Pipe of Water, will strike Purple with Galls ; or how small a Piece of Allum-stone half burnt, or of *Bitumen* made dissolvable, will make a great deal of the

most stinking Water, we know. Let us remember again, that several Springs prodigiously loaded with their impregnating Ingredients, have continu'd Ages beyond our Histories and Memories, and are as highly saturated with their Ingredients now, as when first known, as *Bath, Harrigate Scarburgh, &c.* Indeed, if the Minerals are scanty, the Stream that washes them, strong, they may in time weaken, if not wear out. Some few Accounts we have of such in History, but know not whether Superstition, the Element it self, or impregnating Minerals gave them those Virtues; but the first two are the more likely.

Indeed, if Mineral Waters, by some Accident take another undiscover'd Course, and common Water rise up in the same Springs, they may be said to be lost to us; because they are gone, but in reality continue, tho' in another Channel. A Spirit of such a penetrating, ethereal, subtil, agile nature, must produce very surprising Effects, and be most prevalent in curing the most stubborn and obstinate Disorders, by mixing with the Blood, finding a ready Passage into the smallest Vessels, whether glandular or lymphatic, clearing off extraneous, obstructing or mucous Matter, dissolving and rarefying thick, grumous, stiff Humours, whether from the slowness of the Blood's Motion, the Languidness of its Vessels, or their Distention; or from too large secretions and discharge of the fluid Parts, or a Retention of what ought to be discharged. Hence, the whole Mass is rarefied, the useless or hurtful Parts clear'd off, and the useful made more so; the whole Body is warmed and strengthen'd, the flagged Pulse rais'd, the faded Complexion restor'd, languishing Nature invigorated, and a kind of new Life is inspir'd.

The next Principle in these Waters is Sulphur, discoverable from their Smell, Taste, the different Colours of Black, blackish Brown, Brown, &c. These Waters afford, with Metallic Solutions, their turning Silver a Copper-colour, or black, their discolouring white Metals, their white Scum and black Sludge, which smoke and give a blue Flame; and finally, the sublimed Flowers of Sulphur found under some of their Basons. 3. From the different Colours these Waters give with metallic Solutions, from the intenseness or remisness of their differently discolouring white Metals, &c. we find, some of 'em contain more, others less of the Sulphur. 4. Since some afford precipitated Sulphur, others not; some send Sulphur over the Helm by Distillation, but the greatest Part not; some retaining their Smell to the

the second, third, fourth degree of Heat, and some even till they have boil'd a considerable time; some retaining their Sulphur eight or nine Months, and would have done longer; others, not a Day, with the same Care &c. We find, there is a great difference, not only in the sundry Proportions, but even in the sundry Degrees of Volatility of this Sulphur. 5. From the different Proportions of their contain'd Sulphur, and other Principles, even in weaker Springs, it is plain, the Veins or Body of impregnating Minerals are either not alike rich, or equally dispos'd for Dissolution in the same time. 6. As Sulphur is the common Ingredient of them all, and intitle them to this Class, its Effects upon Animal Bodies are heating, drying, resolving, discussing, opening, inciding; it mollifies, heals, digests, resists Putrefaction, &c. As to the tractable, or fixt Parts in those Waters, they are,

First, Salt, and that chiefly Marine or Nitre: The first call'd by *Hoffman*, Common Salt, and a fixt Alcaline Salt; the last is Dr. *Lister's* Lime-stone-Salt. Now, since *Harrigate* three Sulphur-Wells, *Knaresburgh* and *Bilston-Spaws*, *Oldfield*, *Keddleston*, *Shuttlewood*, *New Clopton*, *Filab*, *Burlington* and *Skipton* Old Sulphur-Well, afford only one Salt, which preserves and brightens the Colour of Syrup of Cloves, turns Syrup of Violets a beautiful Green, instantly precipitates Solution of Silver, crackles and flies on a red-hot Iron, ferments strongly, and smokes with Oil and Spirits of Vitriol and Sulphur, emits an urinous smell with *Sal Armoniac*, and shoots into Grains of a Cubical Figure on Crystallization, or Hexagons like Dees; we say, these contain marine, or common Salt, and that only. Tho' we have observ'd three sorts of it; first, such as upon Crystallization, had the upper sides of its Crystals divided into four Triangles, the Angles of two whereof opposite to the Hypotenuse were obtuse, and the Angles opposite to the Hypotenuse of the other two were acute, as represented in the Figure of *Knaresburgh*-Salts, which, of all others, were the most remarkable for this. 2. The Salt of many of the other Springs afforded Crystals, the same in all respects with those of Sea-Salt. 3. The Salts of some of these Springs laid on a red-hot Iron, stunk as intolerably as Pouder of Roll Brimstone, smok'd and flam'd; others neither stunk nor smok'd. The most remarkable of the first sort, were those of *Broughton* and *Crickle*. Since then all the Characteristics of *Hoffman's* Fixt Alcaline Salt in Minerals are common to Marine-Salt; and since Salts which have all the Marks of his Alcaline

line Salt do crystalize into a Cubic Figure, we say, that this Fixt Alcaline Salt is purely Marine; and Marine is his Fixt Alcaline Salt, which he could not possibly have been mistaken or deceiv'd in, had he separated it from its Earth, and crystalliz'd it.

The second Salt is Nitre. We say, since several of those Waters turn Tincture of Rhubarb of a redish Brown, precipitate with Oil of Tartar and Spirit of Hartshorn, excite not Thirst or Heat in the Drinkers, afford Crystals long and slender, with six unequal sides in the middle, with Points consisting of two plain triangular sides; therefore they contain Nitre, but Sea Water, *Harrigate*, *Crickle* and *Broughton-Spaws* turning it white with Oil of Tartar and Spirits of Hartshorn and *Sal Armoniac* (which Sea Salt dissolved in distilled Water does not, as we have Certainty from many Experiments;) we say, these Waters do also contain a Nitre, which flies off in Exhalation, and leaves only a fixt Marine Salt; which dissolved in distilled Water, gives no further Muddiness, Whiteness or Precipitation with Oil of Tartar and the Alcaline Spirits. Nitre is very cooling, diuretic, purging, quenches Thirst, abates the Heat of Inflammations, and inflammatory Fevers, incises and attenuates gross Humours dissolves grumous, thick and coagulated Blood or Humours, mitigates Pain, &c. We see again, that the Co-existence of Sulphur is not inconsistent with any of those Salts, since *Wirksworth* Sulphur Water is as highly impregnated with Vitriol as Sulphur; the first from the Shale, the last from those sulphurous Marcasites, called the Miners *Brasils*.

We see, it is common to all strong Sulphur-Waters, and to them only, to turn the Earth and Sludge in their Course black, and all other extraneous Bodies white; since they afford fixt Sulphur both naturally in Flowers, in their subterranean Chinks and Grevices, and under their Basons, as also in their Scum and Sludge; and also artificially, by Precipitation: Then they contain real Sulphur, not a meer *Halitus*, Blast or Stream; and that they acquire not their fetid scent and taste by stagnation, as Dr. *Lister* will have it, especially since some of them carry such a prodigious Load of Salt, both Marine and Nitre, as is sufficient to preserve them a long time from Putrefaction, even in a stagnant state; others of them again have a plentiful Current, as *Knareburgh* Sulphur Well; some of them also upon keeping till they have lost their natural smell, become fresh, and then putrid, have a stench very different from their former, viz. like rotten Carrion, as *Harrigate* and *Wigglesworth*, which I have tried carefully.

Since

Since none of all those Waters (one only excepted) have any Appearance of Vitriol in them, whether fix'd or volatile, we have no reason to ascribe the Cause of those Waters to the Solution of a *Pyritis*, which is said to consist of Vitriol as well as Sulphur: And if the last is dissolved, I cannot see how the first should escape: But instead of Vitriol, we have often Marine Salt only, and sometimes that mix'd with Nitre.

Again, corrupted Waters by Stagnation only, will not put a total stop to Fermentation, as these do: But this being peculiar to *Sulphur* only, therefore they contain *Sulphur*. Nor will stinking Waters from Stagnation formerly, produce the like Effects in Disorders of Animal Bodies, either inwardly or outwardly; therefore we say, they contain *Sulphur*.

From our Tryals on the Minerals in and about the Allum-Well Bogg, we see, they afford only Vitriol and *Sulphur*: But neither Marine Salt, Nitre nor Allum as has been falsely reported and believ'd. From repeated Tryals here and elsewhere, we find, that a great many sorts of it contain Vitriol sufficient to impregnate Mineral Waters with this volatile Principle of themselves.

It is also plain, from the Sediment these Waters let fall, on long keeping, or with Solution of Sugar of Lead, or by Exhalation, or Distillation, that they contain an Earth, which is as different as the sundry sorts through which these Waters pass; but are chiefly of the Clayie, Stony, Chalky, and Calcareous kinds; which, as I said before, are by no means hurtful, but useful in the Waters, being equal to the best of the Testaceous Tribe, in blending, smoothing and absorbing those sharp Humours in the Blood, whether acid or acrid.

The greater Coldness in those briny Waters, is the Effect of their Saltness. And, observe we here also, that all those Waters purge in proportion to the Quantity of their contained Salt: Therefore *Harrigate*, *Crofts*, *Wigglesworth*, *Crickle* and *Broughton*, are the chief Evacuants of this Tribe.

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Since therefore *Harrigate, Crickle, Broughton, Croft, Normanby, &c.* are so plentifully stored and impregnated with *Sulphur*, of what eximious Force and Virtue must they be in removing and remedying outward Disorders; how powerful Discussers of morbidic Humours fix'd in any of the extreme or external Parts? From this healing, drying, discussing penetrating Principle it is, that they cure Swellings, Aches, Pains, Numbness, Ulcers, scrophulous or other Scab, Itch, Leprosie, Tetters, Ringworms, creeping, spreading and inflam'd Excoriations, by washing, bathing and fomenting, &c. And since the same Waters, viz. *Harrigate*, are loaded with Marine Salt, then their principal Intentions are Dilution, Calcification, Stimulation, Penetration, Invigoration and Eradication. Hence Nature seems to have conferred this Gift upon those *European* Blands, as the derniere Retort in all Relaxations of the Vessels, Nerves or Solids, in their great Inability and Indisposition to Motion, in gross Habits, corpulent Bodies, and phlegmatic Constitutions especially; or such as seem drown'd in a Deluge of Water, or have their secretory Ducts plugg'd up by gross sizy Humours, weak and inelastic Vessels.

Hence they challenge the Preference of all the Mineral Waters in the North, in Cachexy, Cacochemistry, Dropsy, Jaundice, Palsy, Worms, Inappetency, and Indigestion, Chronic Agues, Quartans especially, hard, swell'd and distended *Viscera*, frequent Abortions, from a slipperiness and Laxness of the *Uterus* and its Ligatures, beginning Dropsies of the *Ovaria* or *Uterus*, swell'd Legs, Swellings or Ulcers after the Small Pox, Measles or Fevers, Disorders from Surfeits, stuffings of the Breast and Lungs from gross tough Humours, fat or watery Collutions, if not extravasated. Hence, such as have been in eminent danger from vomiting or spitting of Blood from a loading of the Pulmonary Vessels, and their Inactivity, have rarely, if ever, fail'd of Relief here: Nay, what really seems a Paradox, meagre, thin, consumptive Bodies, have been cured of the Hæmorrhages here; instance the late Dr. *Prescod* of *Tork*, and his Nephew, and the present Hostler at the *Queen's Head, Harrigate*, who was cured here in the Nineteenth Year of his Age, when his Lungs were also ulcerated.

But these Cases I mark as accidental, not for Imitation : Tho' nothing was more ordinary for Dr. *Prescod*, than to send such Patients hither ; nor can I find one Tragical Instance from it. In Scorbatic, Rheumatic and Dropical Cases, which require the subtil, volatile, and pungent Antiscorbuticks to thin a sizy Blood and Juices, and make them fitter for Circulation and Secretion ; or to rouse up, set, and keep on Action, the dull, sluggish, inactive, resty Solids and Vessels, sure a better Water is not, as no Medicine in the World comes up to it.

Scarburgh, on the other hand, is just the Reverse to it ; its Nitre cooling the Blood and Juices in Choleric, Fiery, Active, Lean Habits, and such as are parched up with hot adust Humours ; whilst its Earth blunts and sheaths the sharp irritating Particles of the Blood, and prevents their doing mischief. Hence from repeated Observations, I declare, it is the only Remedy we have, that truly deserves the Name of a Specific in Hectic Fevers. It not only does all, but inexpressibly more therein, than the Testaceous Pouders, cooling, softening Emulsions, salt acid Droughts, the *Peruvian* Bark, Bitters and Viper-Broth, especially when its Chalybeate Principle is gone, and drank to such a quantity as shall not purge ; laying aside all other Medicines at the same time, except Asses Milk.

As these are the principal Designs of *Harrigate* Sulphur-Waters, so they answer a great many other ; as, in the Gout, Cholic, Arthritic Pains, &c.

Dr. *Dean* and Dr *French* having been so full and plain in their Directions on the Use of those Waters, there can very little be added ; only I would advise a smaller Dose, as three or four half Pints ; and no Drinking in the Afternoon : And except there be something in the Constitution or Distemper to forbid it, as an intense Hectic, some inward Inflammation, a quick and sharp Pulse, &c I would usher in every Day's Dose of the Chalybeate by one, two, or three Glasses of this ; which has also this Advantage, that it is its own Preparative needs no Vomiting or Purging to usher in its Use. Nor would I have Ale drunk to Diet, but Claret, or Red Port-Wine and Water.

Croft, Crickle and Broughton, which have less Salt, and a Mixture of Nitre, are therefore less healing, drying and stimulating; but more cooling, attenuating and diluting; and therefore better adapted to choleric, fixt lean Bodies; such as have a quick, sharp, small Pulse, and Hectically disposed: But of all those, *Croft-Spaw*, as it contains most Nitre, is the best; these also answer the Intents of Sulphur, according to the Proportion they contain of it; which is discoverable from the foregoing Marks, and also the Design of Salt, according to their sundry Quantities, which there is no occasion to repeat, nor to set or prescribe other Rules than for the last; only as the former were more irritating, heating, drying and evacuating, they may be used with greater Freedom by Paralytic, Dropsical, Icteric, and Phlegmatic Bodies; and the last more freely, by Choleric, thin, hectically-dispos'd Persons.

Thus I have remov'd some Rubbist, begun and finish'd some Out-works about these Waters, upon more solid Grounds, and consonant to Truth, than has been by all those wrangling Disputes and sinister Methods used before. But there are a great many *Desiderata, Explicanda* and *Addenda*, together with an easy and certain Method of quickly discovering the impregnating Principles of Mineral Waters, and the Time and Manner of expeditiously procuring perfect Crystals from the Salts of any Water; though a late Writer confidently asserts, that there are a great many Waters, whose Salts will not Crystalize; and a great many things, whose Discovery have been hitherto reckon'd impossible, I could have produced: But having already gone as far as Bounds and Time will allow me, I shall leave these to be searched out afresh by such as shall be thought worthy of better Encouragement, to enable them to bestow more time to this Work.

As I had only Truth, and the Welfare of Human Society at heart, in entering upon, and thus far prosecuting this Work; so if any shall think proper to challenge me with Mistakes, I declare my self an Enemy to Bigotry, and have a ready Ear to hear, and Mind to receive Conviction: But let none from sinister Views, think to draw me into a Controversie, or imagine that I am obliged to answer trifling Queries or Objections; for they will find me mute.

I would also let my Friends hereby know, that whereas I have been put to the Expence and Trouble of several scurrilous Letters from unknown Hands, about a Pamphlet publish'd some Years ago, on some Diseases of the Skin, signed T. S. I declare, I never so much as saw the Pamphlet to this Day, in either Writing or Print, or ever convers'd with any that had seen it : Nor shall I ever publish any thing by initial Letters or fictitious Names ; but either give my full Name, or no Name.

APPENDIX

APPENDIX.

Having had frequent Occasion to mention Drams, Punch, Cyder, &c. in the foregoing Rules for the Use of our Waters, I have here given the Advantages and Disadvantages, Use and Abuse of those Liquors, as explanatory Notes on p. 5. l. 19. p. 69. l. 10. p. 91. l. 27, 28, 38. p. 179. l. 39, &c. having formerly wrote Dissertations on common Water, Ale, and Tea, but had Occasion to say nothing on these others.

ALTHO' neither *English* Malt nor Molossos Spirits come up to the goodness of Brandy, yet the Fault is not in the Grain or Fruit from which they are extracted or made, but from the different Manner of their Preparation, Preservation, or Fermentation, for both Grape and Grain consist of, and afford the like Principles, *viz.* Oil, Salt, Flegm, and Earth, only they differ as to the Quantity and Connection of those Principles; for the Grain has them more closely and firmly united; hence the Necessity of a double Fermentation to swell the compact earthy Parts, make them more spongy and porous, and so disengage, break, and subtilize the oily and saline Parts that they may be separated and extracted from the more gross and earthy. These Spirits differ also in respect of their Separability, Rarefaction, and Volatility; thus some Wines that are stronger bodied, abound more with Sulphur and Salt, afford less Spirit, than others that are thinner and appear weaker; for the spirituous Particles of the last are much smaller, lighter, and finer, and are less entangled in a Viscus; *i. e.* their Spirits are more disposed to Motion, rise more readily and fully off the Earth and Flegm where-with they were mixed.

Spirits of the Grape or Grain are the whole Oil or Salt of these Vegetables, broken and reduced into fine subtile and volatile Particles, smaller and lighter than the Flegm wherewith they are mixed. These Spirits are neither acid nor alkaline, but of an indifferent Nature as to both, which *Boerhaave* has sufficiently proved by several Experiments.

That there is no other Difference betwixt Brandy, Molossos, and Malt Spirits, let us take a View of the chymical Principles which each contain, and wherewith they abound; for all Spirits being obtained by Distillation, it's impossible the Fire should make so great a Difference as is generally believed. Wine distilled yield much Spirit, which is only its Oil and Salts subtilized. Proceed you Distilling, after this Spirit you have much Flegm; after that come over acid Spirits mixed with a sharp, white, nauseous, astringent Flegm; continue the Distillation on and there rises a black, thick, burnt, stinking Oil, which may be separated from the acid Spirits by brown Paper; after all in the Bottom of the Still remains a Mass of Salt and Earth, which may be separated with Water: This Salt is a true, fixed, vegetable, alkaline Salt. Distill Ale or Beer, an inflammable Spirit rises first, then after it a white, sharp, astringent, nauseous tasted Flegm, mixed with an acid Spirit; encrease the Fire more, and you raise a burnt, thick, black, stinking Oil, which may also be separated from the acid Spirits by brown Paper, the acid Spirit is only the acid Salt dissolved in the Flegm. After all you have in the Bottom of the Vessel a Mass like to black Pitch, which is only Earth and a fixed vegetable alkaline Salt. Molossos fermented with Water and cast into a Still yield the same. Grapes contain much Oil, Salt, and a great deal of Flegm. Barley has very much Oil, and but a little essential Salt. Sugar has in it much essential Salt, and not a little Oil. As all these Spirits are in daily Use with us, I shall consider their Use and Effects promiscuously. For as the better Sort use only what's called Brandy, so the poorer must be content with Malt Spirits, which are cheaper, and whose Faults are, 1. Want of Age, which gives it an intolerable empyreumatic and fiery Taste, tho' some pretend to take it off by putting into it dulcified Spirit of Nitre. 2. It's of a lower Standard than true *French* Brandy, for this has about seven Parts of Flegm to nine of Spirits, that has nine Parts Flegm to less than five of Spirits, and very often much less; for I caused twenty Quarts of it to be cast into a Still, and we only got two Quarts of Spirit which would all burn away; *i. e.* nine Parts Flegm to one of Spirit.

rit. 3. It wants that delicious vinous Flavour of true Brandy; this some attempt to give by putting dulcified Spirit of Nitre, or young Budds of black Curran Berries into it, but the remarkable Taste of the first, and the abominable calified Flavour of the second, discover the Cheat.

Good Brandy is clear (its yellowish, brownish, or other Colours, if not fictitious are borrowed from the Cask, wherein it has stood long; others tincture it with Molossos, Saffron, or other Ingredients, but the Deceit is detected by its fiery Taste) not too hot, nor sharp, of a pleasant vinous smell, of a strong Body, good Age, and easily fired. The best way to discover Brandy from Spirits, is, not to taste it, but to pour a little of it into the Hollow of the Hand, and rub it between the Hands, then smell it, and if it have a flagrant vinous smell at first, and retain it a considerable Time, it's good; but if it strike the olfactory Nerves at first with a strong, hot, pungent Smell, then with a sourish Smell like Water that has stood upon Meal till it sour; and lastly, if that Smell be succeeded by a faint one, it's plain you are imposed upon with common Spirits. To try the Standard or Strength of Brandy or Spirits, pour out into a Wine-Glass better than a third Part of the Glass full, take it up in one Hand and cover the Glass well with the other Hand, then shake it till the Bubbles rise, and so set it down; if the Bubbles continue a top several Minutes after it's set down, it's of a right Body; but if they instantly fall, and the Liquor look whitish, it's too low and weak. This is a surer Way than looking whether it leaves Streaks like Oil hanging on the Glass. Burying Casks of Brandy in the Earth, or putting it to lie on the Sea some Months, takes off it's hot empyreumatic Taste, makes it mild in the Mouth and warm upon the Stomach; it's by the last of these Stratagems that the *Dutch* impose upon us with Molossos Spirits instead of right *French* Brandy, tho' if we reflect upon the Principles of both I cannot see any Harm in the Cheat.

Brandy should be drank very moderately, rather from Necessity than Pleasure, so will it be of Service to us, and contribute to our Health. When the Stomach is raw, weak, and lax, a moderate Dram raises a pleasant Warmth, a gentle Tension, and better Digestion; by rarefying the viscid Flegm which loaded it, invigorating its Fibres, and making its Coats play with more Agility and Force. When Flatulency or Wind abounds in the Intestines, a Dram rarefies the retained gross perspirable Matter, and prepares it for an Explosion upwards or downwards, or sends it off by Perspiration; it revives the languid ner-

vous Filaments, affords them new Spirit and Strength for Action, whereby their peristaltick Motion is promoted. If Colicks proceeding from the same Cause grieve the Person and gripe the Bowels by distending their membranous Coats, or Acrimony of the perspirable Matter pricking their Nerves, a Dram relieves him after the same Manner. When the Body is faint and languid, from a Waste or Dissipation of the Animal Spirits, from too much Exercise, too long watching, fasting, or too low and abstemious a Diet, whereby the nervous Juice is exhausted, and the Solids cannot play nor act with their former Vigour, a Dram is so subtile and fine in all its Parts before it's drunk, that in its very swallowing, and as soon as it enters the Stomach, it penetrates and soaks into the Nerves as soon as it touches them, adds to the Elasticity and Force of the Fibres, invigorates their Vibrations, and takes off all Sense of Languor or Faintness. For the same Reasons when the Circulation of the Blood is languid from the decreased Tone of the Vessels, a Dram excites their Vigour and causes a brisker Circulation. After a recent Cold, when the Body is depressed, and the natural Evacuation of Perspiration obstructed whereby the Constitution is loaded, but the Strength diminished, a Dram invigorates the Vibrations of the Solids, accelerates the Motion of the Fluids, promotes their Attenuation, prepares them for Secretions, and passing off by the Skin and Kidneys, especially if the Dram be mixed with warm Gruel and a little Honey, it causes a profuse Sweat, and relieves the small Vessels and excretory Ducts of that sily Matter which loaded them and straiten'd or shut up their Passages. A Dram given in a Decoction of Mallows and Althæa Root, with a little Honey, cleanses the Kidneys, Ureters, and Bladder powerfully; forces away Sand, small Stones, gravely and slimy Matter with the Urine. A moderate Dram used in dropical and cachectic Cases, where the Body is disposed to be over-bulky and in Danger of Leucophlegmatia, or any other general or particular Tumours from a Laxness, Weakness, or Languor of the nervous System, or a Thickness and Toughness of the Blood, especially of the lymphatic Juices, insuperable by the weary'd, resty and weak Fibres: In these Cases a Dram refreshes and invigorates the Fibres, rarefies the Fluids (tho' a too frequent or excessive Use of Spirits has the quite contrary Effect) stimulates the Vessels and secretory Contractions, causes the Blood to flow to the Reins in larger Quantity, and with greater Velocity; hence the Secretion of Urine is encreased, and at the same Time Perspiration encouraged. Lethargic and paralytic People find an Advantage

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tage from a moderate Dram, for it's Spirits being subtile and volatile break and discuss the gross Humours which loaded and laid by the Nerves from Action; it invigorates the Solids, and rarefies the Fluids. A Dram speedily revives the languid Spirits of the weary Traveller, but herein it comes short of the cold Bath, and even of washing the Feet and Legs in tepid Water, or cold Water in Summer. Let a thirsty Person that's very warm, first take a Dram before he drink Water, small Beer, or Milk, so will he prevent the Inconveniencies or fatal Effects which swilling down cold spiritless Liquors produce in such a Case, as an Asthma, stuffing of the Lungs, Obstructions, Inflammations, Impostumations of the Bowels, &c. It is useful in a cold Morning before a Man sets out on a Journey, for it raises a pleasant Circulation and Warmth in the Body. When the Stomach is jaded and weaken by a Surfeit of tenacious Food the precedeing Day, which have left much Flegm in the excretory Ducts of it's Glands, or exhausted it's Spirits, a Dram is good before Dinner. A good Dram given to a Soldier when he is entering the Field of Battle encreases the Motion of his Blood and Spirits, raises Strength and Courage, makes him regardless of Danger, and scorn Fear and Cowardice; but this Alacrity is only a speedy Flash, quickly succeeded by a greater Flatness and low Spiritedness. Drams are chiefly useful to Flegmatic Constitutions, bulky Bodies or old Age, and such as have weak and lax Stamina, exposing them to Diseases of the Head and nervous Disorders or Dropsies, &c. They are best in cold Weather, foggy Air, wet Seasons, or after too solid or tenacious Foods.

But all these good Effects will not counterballance the Mischiefs done by the indiscreet and immoderate Use of Spirits. All melancholy Tempers are injured by them; for tho' a small Dram rarefies the Blood at first, yet the more thin and spirituous Parts exhale sooner, and carry off some of the finest Serum with them, whereby the Blood becomes thicker, and the Solids more dry and stiff. Cholerick Dispositions have their Fibres too much stimulated by its Use, the Acrimony of the Blood and it's Motion, and Agitation are increased by it. The repeated Use of unnecessary Drams in sanguine Constitutions rarefies the Blood at first, makes it distend the Vessels, and some unprepared Parts rush into the Canals of conic Tubes, where they cannot readily pass; hence Fevers and other Disorders. A too free Use of them in any Constitution, puts the Humours into a violent Agitation, whereby their nutritious Parts are unfit to answer their Design, for this great Rarefaction is often succeeded by a Thinness and Watryness of the Blood; hence an ill Habit of Body, a pale Look, and Decay of the natural Actions. When
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the Blood is become watry, it's earthy Particles attract one another, and form a viscous Slime, which furs up the Infides of the Vessels, and still diminishes the Action of the Solids more, till they be loaded with a fizy Mucus; then come on Cachexies, Catarrhs, Dropsies, Palsies, Lethargies, Scurvies, &c. A clear Air, hot Climate, and Summer Season, require less of their Assistance, yet in Summer a Dram is useful when the Weather is exceeding hot, and the Springs of the Fibres so fallen back, that the Body still sweats. Childhood and Youthhood forbid their Use any further than as a Medicine in some particular Cases; but an Excess of the depressing Passions require a moderate Dram in any Stage of Life, except Infancy or Youthhood. All Diseases, from too great a Constriction of the Vessels, or Contraction of the Fibres, and all Disorders from too great a Plethora or Rarefaction of the Blood, Distempers from a too great Acrimony of the Juices, all Inflammations, Impostumations, or Schirrosities of the Bowels, absolutely forbid their Use; Asthmas, tickling dry Coughs, cretaceous Knots in the Lungs, palpitations of the Heart, concretions of fleshy Substances in the Vessels, ardent Fevers, &c. are rendered much worse by the least Indulgence of Drams. All Spirits cause Drunkenness by an Overfusion of the Fluids and Distention of their containing Vessels; hence Headachs and Pains from saline *Spicula* darting into and pricking the relaxed Vessels and the slimy Matter deposited on their Infides, which weakens them and soaks them with Flegm, till the Person becomes paralytic, lethargic, apoplectic, convulsed, stupid, &c. and often Spirits kill the Drinker upon the Spot, from all which we cannot help thinking, that the World had been happier, had Men never been accustomed to Brandy or Spirits; for such as content themselves with Water, or clear fine Table-beer, are more vigorous, healthy, and long lived than Drammers, who mostly make themselves diseased, and at last become more like Beasts than Men.

Rum is another spirituous Liquor, often used in Punch; it is made in the *West-Indies* of Sugar Canes, and is of a stronger Body than Brandy, *i. e.* it contains a larger Quantity of Oil, and less Flegm and Salt: It's Oil is less attenuated and subtilized, whereby it's volatile Salts are more embarrassed and sheathed up. Neither is it's Oil reduced to such minute and subtile Particles; either because the Canes were less fermented with the Water, or because the Oil and Salt of this Cane are more viscid and gross, than those of the Molosses drawn from the Sugar, which has undergone the sundry necessary Operations, and has been thoroughly fermented afterwards. For altho' all thoroughly fermented

mented Liquors afford much more Spirit, in Proportion to their Body and Kind, than the less fermented; yet it is certain, that the sundry Operations Sugar undergoes in the making, may, and does, break, attenuate, separate, and divide the Principles in the Molossos (tho' the grossest of the Sugar) more than these same Principles existing in the crude Cane, where the firm Union of the gross Oil and Salt makes the unprepared Sugar of almost a loathsome luscious Taste. And also, all Liquors, thoroughly fermented, have, during the Fermentation, a free Access and Communication with the external Air; whereby the intestine Motion is promoted, and the smallest and most separable Parts are too much attenuated and reduced to a subtile Aura, which exhales to the depauperating of the Liquor of much of its finest Parts; hence it yields less (tho' a subtiler) Spirit.

That Rum which is of a brownish, transparent Colour, of a smooth, oily, grateful Taste, of a strong Body and Consistence, of a good Age and well kept, is the best: That of a clear, limpid Colour, an hot, pungent Taste, is either too new, or dashed with Spirits.

To such Palates and Stomachs as can bear it, Rum is certainly preferable to Brandy, either for a Dram or Punch, in many Cases. Brandy (*e. gr.*) is a Diuretic, because it stimulates the Vessels, and rarefies the Blood, whereby only its finer and more serous Parts are strained off by the Kidneys: But Rum not only stimulates by its Salts, but lubricates by its more and grosser Oil, and thereby expands and dilates the renal lateral Vessels; whereby, not only the thinner, but also the grosser and more excrementitious Parts of the Blood are allowed a ready Passage thro' the renal Strainers, and get off by the Ureters. Again, where the Vessels are sluggish, and the Blood fizy, Brandy promotes Perspiration in a gouty Habit, and forces off Part of the Salts by Urine; as it, at the same Time, carries much essential vegetable Salt into the Blood; but Rum softens and dilates the Vessels more: Hence a freer Perspiration both of Salts and Serosities, as well as a Discharge by Urine; and at the same Time it conveys less Salt into the Blood, and its more and grossy Oil sheaths the Remaining Acrimony of the Blood, which answers two valuable Intentions, 1. It thereby dilates the corrugated capillary Vessels, wherein the gouty Matter was stopped and lodged, and the Relaxation of the Vessels gives Nature an Opportunity to pour in thinner Fluids upon these gritty Lodgments and sharp Matter, whereby they are diluted, dissolved, thrust forward, and expelled by the excretory Ducts of the Skin. 2. It blunts the Edges of the pointed pricking Salts, and obtunds the reigning Acrimony,

crimony, makes it less uneasy to the Patient, till the elastic Vessels can attenuate, separate, and dissolve it, so as to be either perspired or thrown back into the Blood, till it arrive at and be strained off by the Kidneys.

In nephritic Pains and gravelly Cases, where the Vessels are always much contracted, and sometimes inflamed, the Use of Rum is preferable to that of Brandy; because it relaxes the Contraction more, increases the Stream of Urine, and makes Way for the obstructed Matter to pass off, or be forced and washed out of the Channels. Bilious Constitutions can bear the Use of Rum diluted with Water better than Brandy, because their Solids being elastic and contracted, and their Vessels narrow, and Fluids acrimonious, for whatever blunts the Acrimony of their Juices, and softens and dilates their Fibres and Vessels more, must be beneficial: On the contrary, whatever adds to the Stimulation and Contraction of their Solids, and the Sharpness and Saltiness of their Fluids, must unavoidably be hurtful. All such as have more elastic Fibres, contracted Vessels, sharp and thin Juices, lean and slender Bodies, if they will be meddling with Drams (which, if they prefer Health and long Life, to Taste and Luxury, they should use but as Medicines, *i. e.* from Necessity, not Choice or Pleasure) should prefer Rum.

Hard Drinkers who have broken their Constitutions by frequent Debauches, will have a moderate Dram, that will not only raise, but preserve the Tone of the Stomach, maintain and strengthen good Digestion, and keep them from being too much damped; here Rum should take Place of Brandy, not only because it fills and invigorates the nervous Tubes with less volatile and more durable Spirits; but at the same Time it's Oil blunts the Points of the Salts, which other Liquors have left too plentiful in the Blood.

In chronical Asthma's, Coughs, and Stuffing of the Lungs, if any moderate Dram may be allowed, Rum is the best, because it's Spirits are less volatile, it's Oil more and grosser, to smooth the stiff and contracted Vessels, expand their Sides, make Way for Spitting, and by it's solid Particles clearing the Tubes of some Parts of their infarting Load.

In choleric Disorders, from acrimony, pricking, paining, and tearing the nervous Threads, Rum offers fairer for Relief than Brandy, because it is more oily, smooth, and softening. It is also more suitable to old Age, because, at the same Time it stimulates, it also lubricates and dilates the Vessels, whereby they keep longer open and
passable,

passable, the straitening shutting up, and Coalescence of which, is the only Cause of old Age and natural Death.

In recent great Colds, without a Fever, Rum is more serviceable than Brandy, provokes both Perspiration and Urine more powerfully, as it sheaths the Salts, makes their stimulus less sensible, and contracts the Vessels less; nay, its Sulphur smooths and dilates them more.

When the Person is very hot and thirsty, a Dram of Rum is much better to drink than Brandy, before Water, small Beer, or Milk; for this keeps the Vessels more pliable, dilated, and lax, maintains a freer Course for the Fluids to pass without Lett or Stoppage. For the Mischiefs done by Water, or such small Liquors in this Case, is, being drunk cold, they suddenly contract the Vessels so as the Liquids cannot pass, their finest and thinnest Parts are discharged thro' the Interstices, or forced along the Tubes, whilst the more gross are obstructed, fixed, and wedged in; hence Obstructions, Stagnations, Inflammations, Ulcerations, or Mortifications, or Schirrus's and carcinomatous Tumours of some *Viscera* of the lower Belly.

But for these Reasons, phlegmatic and corpulent People must still allow Brandy the Preference, because it stimulates more, and raises a greater Contraction; for it abounds more with Salts, and its Oil is more subtile, exists in smaller Particles in the Liquor, and their Vessels and Fibres are so soaked in insipid Humidities, and relaxed with Oil, that they want no Lubrication, nor the Salts in their Blood any Absorbent. Cachectic, hydropic, lethargic, and paralytic Persons must also chuse Brandy on the same Account; and so must those who have furr'd-up Vessels and foul Glands (which raise scrophulous Knots, œdematous Swellings, whether fixed or shifting) for the Spirits of Brandy being more fine and subtile, they rarefy the Blood and stimulate the Vessels more. In excessive hot Weather, when the Fibres are much relaxed, and Perspiration or Sweat profuse, Brandy must have the Precedency, because it stimulates and contracts more, and rarefies the thick and fizy Matter better, raises a brisker Motion in all the Juices; tho' it must be owned, that these its good Effects are but of short Standing.

In a moist, foggy, or marshy Air, where the Moisture hangs upon the Skin, and straitens or stops the Mouths of its excretory Ducts, and diminishes Perspiration; or where the Spring of the Air is weakened or broke, so that it neither expands it self sufficiently in our Lungs, Food, nor Blood, but renders the Juices both Ways fizy, a Dram of Brandy is better than Rum.

But in an infected Air, Rum is before Brandy, because it leaves more Oil in the Mouth and Throat, which entangles and imbibes the infe-

etious *Effluvia*, or *Miasmata*, floating about and hanging in the Atmosphere, and sucked in together with the Air: And in this Case, the greatest Preservative is, to spit out all our Spittle, whilst we are in that infected Air; but especially when we are in the Houses or about the Beds of the Sick: But in this Case, Sack exceeds both.

But because Rum is more balsamic, and less volatile, an Excess of it is overcome with more Difficulty; because 'tis of harder Digestion in the Body, and loads the Vessels more, and so the Abundance of its Oil may prevent the Pungency of the Salts; yet all Oils, when the Watry Part of the Blood is much drained off, become rancid, dispose the Blood to Coagulations and Stagnations, the Effects whereof are Chronic, and often dangerous Disorders. It is true, Spirits of the Grape do also coagulate the Blood; but that is upon another Account, *viz.* Thirst; the speedy and great Rarefaction of our Juices, whereby they get into too small Vessels, where they are driven forward, till the Motion of the more earthy and saline Parts are first retarded, and then stopped; have their watry and more serous Parts squeezed forwards by the *Conatus* of the Sides of the Vessels to come together: Thus the more fluid Parts are expelled and grosser retained: Hence the Blood becomes thick and fizy. 2. All Spirits of Wine coagulate the Blood from the vast Quantity of Salts they contain; which Salts being of a most attractive Nature, they not only attract themselves, but also the earthy Parts of the Blood, render it thick, black, and grumous; the thinner Parts being separated and expressed. But it does not herefrom follow, that, because Spirits thicken the Blood, they are therefore proper in a too thin and dissolved State of this Fluid; for the Salts stimulate the Vessels too much, heat the Body to an intense Degree, cause an Hectic and Waste, by encreasing the Force and Resistance of the Solids, and their Triumph over, and the Attenuation of the Fluids: And not only do the Salts stimulate, but abrade and wear the Insides of the Vessels, so that both Solids and Fluids are damaged, and brings the Body into languishing Atrophy, and Death concludes the tragical Scene.

It is on the same Account that a liberal Indulgence of White-Wine brings on a *Chlorosis*, Paleness of Countenance, Leanness of Body, and Death: And this is chiefly the Fate of those who accustom themselves to morning Whets, which are the Ruin of many brave Constitutions.

Rack, or Arack, is brought to us from the Eastern World, as Rum is from the Western: It is the Product of Rice, which abounds very much

much with Oil, and grows chiefly on very fat Earth in hot Countries, where the Sun's great Heat, and the great Plenty of Sulphur in the Earth, causes a very plentiful Ascension of that Principle into the Ears of the Grain.

Rack exceeds Rum much more than that did Brandy: It is more softening, balsamic, restorative, and amicable to Nature; us'd either in Drams or Punch it makes much less Waste and Wear of the small Vessels. Its chief Principle, next to Flegm, is a fine subtile Oil, of such minute Parts, that it readily incorporates with Water: Therefore it is better in all Cases, where repeated Debauches have worn and abraded the internal Surfaces of the Vessels by much Saline, or other solid Particles, sent into, and kept in too large a Proportion in the Blood; or where our Juices are too sharp, acrimonious and Pungent. Wherefore Rack should be chiefly preferred by gouty Persons, and others that cannot comply with a sober temperate, and rational Life, for Reasons already insisted upon in what we have said above concerning the Nature of Rum. It is more advisable in a clear Air, to aged Persons, bilious Constitutions, or when the Fibres are too strong and elastick, or the Fluids too thin, agitated, dissolved, wasted, or saline; or where sharp, tickling, dry Coughs attend, or the trachæal Ducts are too dry and rough, or the Blood too sharp and corroding, causing frequent Hæmorrhages of the Blood (but here, truly, no man that prefers Life to Taste, Custom, and Company, should indulge the Use of any Spirits) and Loosnesses. Thin, lean Habits can bear this better than any other Spirits. A moderate Dram of it is a great Friend to *Venus*; because it is not only subtile, and a little stimulating, but soft, smooth and balsamick, and helps to fill these Vessels with a suitable Liquor. It exceeds in all those Cases, where Rum is recommended, and has much the Preference of it. For Satisfaction herein, I shall refer you to what I have said above concerning Rum; which, for Brevity's sake, I shall not now repeat.

But Rack is still worse in those Circumstances where Brandy is preferable to Rum; because it has less Salts and more Oil, is harder of Digestion, sooner turns rancid, causes more and greater Obstructions, is injurious therefore to phlegmatic Constitutions, to Persons of lax Solids, and fizy or thick Fluids.

The oftner I reflect on the Mischief done by distilled Spirits, the more I am confirmed that the human Race had been happier had Drams never been known, and cannot help cordially joyning with Dr.

Allen (Synopsis Medicin. Art. 1633, 1634.) That the plentiful devouring of those Spirits has killed so many thousands of Men as there are Stars in the Sky: Nay, ten Times ten hundreds of Thousands have died by these, more than all the rest of Poisons whatever. This Poison not only occasions violent Distempers in a great many, but also sometimes sudden Death in some; wherefore if vinous Spirits deserve not the Name of a Poison, he neither can learn nor conjecture what else they should be called, for taken inwardly they are detrimental almost to all Animals. And that these Effects of Spirits are not Fancy or Opinion, Mr. Hales has proved from Experiment (Hæma Statics p. 128, 129.) That Brandy contracts the Coats of the Blood Vessels, and thickens the Blood and Humours, both which Effects contribute to the sudden heating of the Blood, by much encreasing thereby its Friction in the contracted capillary Vessels; which sudden Heat is also further encreased by the mere Mixture of Brandy with the Blood, which glowing Heat soon ceases. Hence it is the unhappy habitual Drinkers of Brandy and other distilled spirituous Liquors do so insatiably from Time to Time thirst to drink of that deadly Liquor, which by often heating the Blood and contracting the Blood Vessels, does by Degrees reduce them to such a cold, relaxed, and languid State, as most impetuously drives them to seek their Relief in that Liquor, which they too well know both by their own Experience, as well as by the daily Destruction of thousands, to be so very baneful and deadly, as to become by the great Abuse of them the most epidemical and destructive Plague that ever befel Mankind. Whatever Service a seasonable moderate Dram may be of, when taken as a Medicine, yet this beyond all peradventure is and will be the Result of a habitual Use, or Abuse of those Spirits, whilst human Fabricks consist of the Materials they now do. And if these are the Effects of Brandy on Animal Bodies, what can we say for unnecessary customary Tippling of Punch, which is only now two Parts Water to one of Brandy, with Lemon or Orange Juice added, both which are also Contractors of the Vessels, and Thickeners of the Blood, like other Acids. I have often wondered that seeming Bravery which could swallow down liquid Fire, as Mountebanks and Jugglers do lighted Tow or Flax, should yet be so cowardly as to boggle at the Use of mineral Spirits more than Vegetable, and so have Aqua Fortis or Aqua Regia become a common Tipple, the unnecessary Use of both terminate in the same Thing, Death, Death; and the known Effects of both make the imprudent Drinker Felo de se: Tho' both acid and alkaline Spirits, Pills and Bolus's are
good

good Medicines yet what wise or honest Man would make a Bowl of Punch of the first, or a Dish of Meat of the last, for Use.

Of those Spirits is Punch made, into the Nature of which we shall briefly enquire.

The Use of Sugar in Punch, is, to give it a more agreeable Taste, to sheath the acids of the Lemon, and prevent Gripes, Flatulency, Pricking and Pain in the Bowels. The Sugar for this Use should be well refined, very white, hard, and sparkling when broken, like small Crystals, and of a pleasant smell, somewhat like that of a Violet.

Lemons are an Acid, and quench Thirst by stimulating the sluggish Glands and secretory Ducts. Their Juice puts a Stop to the Blood's Rarefaction, and thickens it when over thin, stops its too rapid Motion, and therefore is very serviceable in ardent Fevers, and all Poisons which act by distending and relaxing the Vessels, and over-rarefying the Fluids; such as Poppies, Opium, Hen-bane, *Coculus Indiae*, &c. Lemons strengthen the Stomach by giving a fresh Tone to its palled Fibres, and thereby enervating it: They provoke Urine by giving the renal Strainers a pleasing Stimulancy, and obtunding the *Alkali* and Salts of the Blood, and causing the Fibres to shake off their slimy adhesive *Mucus*. They are very serviceable in Headachs, and all Pains which proceed from a rarefied and thin Blood, stretching and paining the Vessels. They restore the Crasis of the decayed Blood very successfully. Their Acidity makes their Use very successful in an Overflowing of the Bile, or where there is a Predominancy of bilious Humours in the Body; because they draw up the relaxed Strainers of the Liver, and give a too fluid Blood a better Consistence.

They are no less serviceable in a *Dabetes*; for altho' they be diuretic, yet they thicken the Blood like other Acids, contract the renal Glands, and check the Force or Power of the *Alkali* in the Blood. They are excellently adapted to very hot and dry Weather and Climates; and to bilious Constitutions, and such as are disposed to Chachexies and Dropsies: They are no less useful to such as have weak and relaxed Fibres and Vessels. They give an agreeable acid Taste to several Sauces and Meats: They are most efficacious in Vomitings, especially of green, yellow, rusty Matter. Their outward Rind, or Peel, heats the Body as the Juice cools it. It is an excellent stomachic, antiscorbutic; and comes in good Play against Agues, and all Diseases from a Viscidity of the Blood; because it abounds with a fine subtile Oil and volatile Salt, which give the Blood a greater *Momentum*, break its Cohesions and Attractions, encrease its Motion and Agitation in the Vessels.

sels, promote Perspiration, lessen the Quantity of Humours, and relieve the oppressed Vessels of a Part of their Load.

But wherever the Blood is too thick, Lemon Juice is hurtful; because Acids thicken it more, and make the Vessels stiffer and stronger. Where an acid Salt prevails in the Blood, Lemons are prejudicial; for they add to the Acidity, because their Juice abounds in acid Salt and Phlegm, but has little Oil. Their Juice, used to Excess, cools too much, condenses the perspirable Matter, fills the Bowels with Wind: Hence Indigestion, Flatulency, Vapours, sour Belching, Gripes, and chronical Pains. But Sugar added to the Juice prevents its bad Effects, and makes it more friendly to the Stomach, as the first sheaths up the Acidity of the last, and hinders its Pricking or Paining the Coats and Nerves of the Bowels. They are hurtful to phlegmatic Constitutions, old Age, and to the Inhabitants of cold and moist Countries; because they cool and thicken the Juices of the Body too much. The best Lemons for Punch are those that come from hot Countries, large, soft, of an aromatic and pungent Smell and Taste. The least Speck of a pricked Lemon will spoil a whole Bowl of Punch. Lemons in Punch make it more diuretic, help to prevent Drunkenness, and the overheating of the Body with Sugar and Spirits: They hinder the Blood's Rarefaction, and excessive Thirst.

Seville Oranges have less acid Salt in them than Lemons; and this Salt is entangled in a more ropy, viscous Phlegm than that of Lemons; therefore a larger Quantity of Lemon Juice is necessary, as it is less acid. Both of them contain but little Oil, and the Nature and Properties of their Juices are so much the same, that we need not insist any further upon either.

What we have already advanced on the Properties of the sundry Ingredients of Punch, will facilitate our Labour here, and comprehend what we have to say upon it in a very few Words. Punch therefore of a right Strength (which should at least be three Parts Water to one of Brandy, except to gouty or aged Persons, who require it stronger) and moderately drunk, is an admirable Liquor (provided it be made of *French* Brandy, or of good old Molossos Spirits, which if rightly made, kept, of a strong Body, and purified some Months with Sea Air, are every whit as good) and an excellent Diuretic; it powerfully cleanses Kidneys, Ureters and Bladder from small Stones, Sand, and fabulous Matter, from the Thinness of the Liquor, subtile Oil, and volatile Salts of the Spirits, Oil and fixed Salt of the Sugar, and austere Salts of the Lemon; which wash off, separate, and dissolve

these Cohesions in the urinary Passages: The Acidity of the Lemon gives a *Stimulus* to the Vessels, and at the same Time the Salts encrease the *Momentum* of the Blood.

Not only are these viscid and fizy Combinations of the Blood broken and dissolved, and the Juices attenuated and thinned in the urinary Passages and Strainers, but all over the Body; therefore will these volatile Salts clear and cleanse the secretory and excretory Ducts of the Skin, and promote a free Perspiration, which makes Punch very serviceable in recent Colds.

Weak Punch checks a febrile Heat, and prevents the too great Fluidity or Rarefaction of the Blood; in the first Case, it restores the due Consistency of the whole Mass, and makes it fitter to pass the respective Strainers of the Body, as it dilutes the Juices, gently stimulates the Vessels, thins, grinds down, and forces forward the obstructed Matter thrown into the capillary Ducts, during the Blood's Rarefaction. For all Heat in the animal Body, arises from an increased Action of the Solids against the Fluids, and of the Fluids resisting the Solids, and both mutually acting upon, and resisting one another, grinding down, and destroying the globular Part of the Blood, so as it is enabled to enter the Orifices of smaller Vessels, than its respective containing Tubes; and as it advances forward in these Capillaries, its Motion becomes slower, and the Action of the Vessels upon it greater, and the Propulsion of the Blood behind, stronger; all which encrease the Body's Heat, the Blood's Attrition and Waste; and indicate the Use of a Liquor that may thin, cool, and check the Blood's Motion and Fury, and the Dryness and Parchedness of the exhausted and weakened Vessels. And such a Liquor is this weak Punch, made pretty acid. This answers the second Intention, which was the Prevention of the Blood's too great Fluidity, or its Arrival at such a State as I just now mentioned.

If Punch be drunk very acid, it checks the Over-flowing of the Gall, and the Redundancy of *Alkali* and Acrimony, and oily Sharpness: And therefore should be proper in a Jaundice; but that the Vessels of the Liver are hereby stimulated and contracted, and the Contraction or Obstruction of the hepatic Vessels is the Cause of the Distemper, and therefore whatever corrugates them more must exasperate and not remedy the Disease.

It is a great Friend to a palled and relaxed Stomach; it thins and carries off its Slime and *Mucus*, sweetly Stimulates and restores the decayed Tone of its Fibres: It cures stinking, bitter, and nidious Belchings.

ings and Vomitings, which always proceed either from an alkaline or oily Acrimony. It helps Indigestion and Want of Appetite, by stimulating, and supplying with nervous Spirits the relaxed muscular Coats of the Stomach. It is an Antidote against bilious Cholicks, Gripes, and blackish, frothy, fetid Stools, which proceed from too much Bile. It invigorates the Fibres and Solids, as well as dilutes the Fluids, whereby Secretions and Evacuations are carried on more regularly: It scowrs and excites the sluggish, furred up, and resty Tubes of the Glands; and therefore is of singular Use in Cachexies, Dropsies, Leucophlegmacies, serobutic, leprous, and scrophulous Habits: All which are owing either to a viscid, or alkalious State of the Fluids; and some of them to a weak and relaxed State of the Solids; from which also spring lethargic, paralytic, and comatous Indispositions; And therefore, weak and acid Punch will make a proper Drink. It is a notable Cooler in hot Weather, and a Preservative in an infectious Air. And because it raises the Solids, dilutes the Fluids (if not too acid) forces forward obstructing Matter in the small Vessels of the extreme Parts, and promotes Perspiration, it is therefore good in the Gout.

It is the best Liquor in the World to them who have palled and weak Stomachs, Indigestion and Want of Appetite, from frequent Debauches with Malt Liquors, luscious thick Wines, Idleness, and Want of Exercise; which have foul'd the Glands and indisposed the Body. The Universe cannot afford a better Liquor for Phlegmatic Constitutions, and bulky Bodies. Students, who have lost Appetite and Digestion, or contracted a cachectic Habit of Body, may expect much Relief from this, and Exercise, in a clear Air. Whenever the Blood abounds with too much Sulphur, Mucus, or alkalious Salts, this is an incomparable Draught for ordinary. But in these Cases its Use must be laid aside, when it hath answered its End, lest it occasion Illnesses of a contrary Nature.

But altho' it oblige us with all these, and several other good Services, in a high Degree, yet it is injurious to choleric Tempers, and thin, lean Habits; for it wears their Vessels, sends off the nutritive Parts of their Blood by Urine, encreases the Elasticity of their Fibres, promotes their Perspiration, and adds to their Evacuation. It likewise encreases the Rigour and Stiffness of old Peoples Vessels and Solids, and sends off precipitantly the finest of their Fluids by Urine. It is highly injurious to them who have large and unpassable Stones lying dormant in their Kidneys: For it augments the Current of the Water, enlarges the Cavity of the *Pelvis*, moves the Stone out of its Repository,

ry, raises most excruciating Pains and Death. It is destructive to Hectical Persons, because it wears and wastes their Solids too fast, and exhausts their remaining Fluids, by immoderate Perspiration and Urine. It is no less hurtful to them, who have Ulcers in their urinary Passages, as it commands a more impetuous Flux of Humour into these Parts; and the Salts of the Urine inflame and irritate them more. For the same Reason, its Use cannot be advised, nor safe, in ulcerated Lungs, tickling Coughs, &c. where Abortion is threatened; whatever irritates and stimulates these Parts, must create a Miscarriage. In a Dysury or Scalding and Heat of Urine from its Acrimony, Punch adds to its Acidity, and increases the Heat and Inflammation; therefore its Use must not be allowed. Those whose Stomachs have a very thin mucous Coat, cannot drink it without a Pain at their Stomachs.

In arthritic Pains, Punch aggravates the Symptoms, both as it adds to the Sharpness, and encourages Inflammations. To the more laborious and drudging Part of Mankind, it is just nothing at all; for it sends off the nutritious Juices, which should repair their Waste, and wears their Fibres and Vessels.

As I have given Rum and Arrack a separate Article, its needless here to be tedious in discoursing on their Punch. It is enough, to add briefly, that as these Liquors are of a stronger Body and more oily and balsamick Nature than Brandy: So they are better (if not made too acid with Lemon) for gouty, aged, and bilious People; for Arrack, containing much fine small Oil, it lubricates and dilates the Passages and Vessels, makes way for the Matter of gouty and arthritick Pains to pass off through the Vessels. The Water, Sugar, Rum, or Arrack, do all join to lessen or take off the perpetual Stimulus of bilious Persons Fibres, to sheath the Acrimony of their Blood and Juices, to keep the Vessels more extended, and so preserve the elastick Solids from triumphing over the too much attenuated and dissolved Fluids. Rum, or Arrack Punch makes a noble Diuretick, cleanses the Glands, excretory Ducts and Pelvis of the Kidneys from all Congestions of gravelly Matter; this Punch, if little or no Acid be added to it, is a much better and safer Drink in tickling Coughs, Stuffings of the Lungs, Asthmas, and other Disorders of the Breast; because the Oil of the Arrack softens and dilates the pulmonary Vessels, lines their inside with a fine oily Mucus, removes their Stimulus and Irritation, makes Spitting easier; the Salts of the Sugar at the same time, deterge, break, separate, and cleanse away the viscid, inactive, or

gritty Matter which stuffed the Vessels. It agrees better with such as have a thin mucous Lining on their Stomach, excites Pain less; (but indeed this is chiefly the Fault of the Lemon or Acid in any Punch.) If drunk in a moderate Quantity, it intoxicates less, and raises not so much Pain in the Head, because it has fewer Salts to fix into and prick the delicate Vessels of the Brain. In a Word, its Use is more safe in any too elastic or rigid State of the Fibres and Vessels, as it stimulates less, raises not such a rapid Circulation, Attenuation, and Attrition of the Juices.

But Brandy-Punch must have the Preference in febrile Heats, quenching Thirst, cooling and refreshing; therefore this is more adapted for Summer Service, and the other to Winter Use. This must also be preferred in all Constitutions which have an alkaline or oily Acrimony predominant in them, because it has more Salts and less Oil, as in hot, sharp, oily, bitterish Vomitings, slight Inflammations, tendency to Gangrenes or Mortifications; black, livid or pale Erosions, loss of Appetite, loathing of Food; loose, most fetid, shining, dark, or blackish Stools; very brown, sharp, fetid, thick, froathy Urine, half putrified when made, and deposits little Sediment and Sweat of the like Nature, in a thin, dissolved, florid, scarce, coagulating Blood; in Decolorations, and Blisters rising on the Skin, in frequent Eruptions of purple or livid Spots and Buboës; in a stinking, cadaverous fetid Breath, in a bitter, stinking, oily, or salt Taste of the Mouth, in a rancid, fat, sharp Taste of the Mouth like burnt Oil; in nidrous, hot Belchings, smelling like rotten Eggs, or Sulphur; in fat, white, fetid Stools, feeling exceeding hot in the Passage; in Scurffs, Dandriff, Leprosy, or large, hot, ichorous Eruptions on the Skin; in all lethargic, paralytic, apoplectic, and comatose Dispositions; in all hydropic, scrophulous, cachectic Habits; in all Viscidity and Siziness of the Juices, Foulness, Loading, Dilatation or Stuffing of the Glands with slimy Matter; and in a too great Weakness, Laxness, and Imbecility of the Fibres, Solids, or Vessels, Brandy-Punch exceeds that of Arrack or Rum, because it is more saline, stimulating, and deterging, &c. but where there are manifest Signs of an Acidity in the Blood, Arrack comes in better Play.

Mileſii Niſſeni de Ebrietate Epigramma.

*Ebrietas commune Malum, ſuaviſſima Peſtis,
 Hæc mea per Titulos Fama feretur, ait :
 Illa ego Terrarum Domitrix, Regina Malorum,
 Quæ clarum toto Nomen in orbe gero.
 Dux Scelerum ſuprema vocor, Vitiique Magiſtra,
 Nil niſi dulce Malum, nil niſi dulce Neſas.
 Mors Animi, gratiſque Furor, blandumque. Venenum,
 Morborum placidus Fons, et amica Lues.
 Gurgulio, Fundi Barathrum, Cenſuſque Vorago,
 Ultio ſum præſens, ipſaque Pæna mihi.
 Syrtis, Hydrops, Syren, Scylla, inſatiata Charybdis,
 Grandior & Furiis omnibus eſſe feror.
 Nam quæ geſtarum mihi ſurgat Gloria Rerum,
 Notum eſt eois occiduſque Plagiſ.
 Nullus erat ſævis unquam Bellator in Armis,
 Qui dederit gelidæ millia plura Neci.
 Nemo tot impune Cædes, tot Funera Nemo,
 Edidit, ac noſtræ ſæpe dedere Manus.
 At mihi quæ Generis Series ab Origine pergat,
 Aut quæ ſint Partuſ Pignora chara mei,
 Quæ Mala, quantaque Damna feram Mortalibus ægris
 Quo ſim victa Modo, quo reprimenda Metu.*

Of C Y D E R.

THIS Liquor owes its Invention to a *Norman*, who much admired the delicate Flavour of Apples: And long Obſervation aſſures us, that ſuch as chiefly drink Cyder are more healthy and ſtrong, and have a better Complection than ſuch as are accuſtomed to Wine or Ale. Both my Lord *Bacon* and Dr. *Baynard* tell us of ſeveral Perſons near a hundred, and ſome above, who, having ſeldom uſed any other Liquor, were very active and vigorous at that Age. It is certainly more nourishing than Wine, for not being ſo thoroughly fermented, its Spirits are leſs ſubtile and impetuous, and being more intangled in a viſcous Phlegm, and more diluted with Water, they exhale not ſo ſpeedily. And becauſe it is leſs ſpirituſous than Wine, it is therefore more

cooling and moistening, and less intoxicating; but for the same Reason, when it's drunk to Excess, its Effects last longer; for its viscous Parts prevent the sudden Dissipation of its Spirits; besides, the Viscidities are also dispersed in the Vessels of the Brain, and so fill up its small Tubes as to obstruct the brisk Motion of the nervous Juice, and lessen its Influx. The viscous Parts being the lightest, they will always lie next the Sides of the Channels, while the more fluid Parts keep the Axis, and therefore the like Quantity of this Liquor will not invigorate so much, or so speedily as Wine. But then after a drunken Bout of Cyder the small Vessels require a longer Time to reassume their Elasticity, to attenuate and shake off the adhering Viscidities from their Insides: and because the more viscous Parts of the Liquor are nearest the Sides of the Vessels, the watry Parts next them, and the more subtile Parts keep the Axis, therefore Persons drunk with Cyder are more stupid, sleepy, pale, and cold, than those that are intoxicated with more spirituous Liquors, such as Wine, Brandy, Punch, &c. These being more spirituous, *i. e.* having a greater Quantity of attenuated essential Oil and Salt in them, give a greater Stimulus to the Vessels, raise a brisker Pulse, and make Persons more cheerful and merry, frantick or mad; but Cyder abounding more with a viscous Phlegm than Wine, will therefore nourish more, and its Nutrition be of longer Continuance, tho' not equal to pale Ale.

The Properties and Effects of Cyder differ according to the Difference of the Fruit it is made of, its Preparation, Keeping, Age and Body: The greatest Part is made of harsh, wild, common Apples, such as grow plentifully in the Fields of *Herefordshire*, *Worcestershire*, and *Glostershire*; some is made of fine Table Fruit, as Golden, Kentish, and *Kerton* Pipins, Pearmaines, &c. and some of a Mixture of these Fruits. That is the best Cyder which has most Plenty of essential Salt and Oil, and these well attenuated, dissolved, and rarefied by Fermentation, till they be reduced to such subtile Parts as afford a Spirit like that of Wine or Ale. What is made of wild, harsh Apples will keep longer than the sweet Cyder which is made of table Fruit, because it has much more essential Salt, which is its tartarous Part, and gives it its rough Taste. This Plenty of Tartar breaks and dissolves the Sulphur into very small Particles, and reduces it to a subtile Spirit, which abounds in this Liquor, and is retained by the fine Salts, so that this Cyder neither dies, corrupts, nor turns rancid so soon as the other: For the like Reason it requires to be longer kept before it come to Perfection, that is before it deposite its Tartar and

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Feces, and reassume its Spirit from the Mother. But sweet Cyder having more and grosser Oil, and less essential Salt, the last is not sufficient to excite a compleat Fermentation, *i. e.* to attenuate and dissolve the Oil by strong repeated Occursions and Collisions; nor does their Action upon one another break and strip them of their Viscidities which sheath them, for which Reason this Cyder gives no Pungency to the Taste, nor Irritation to the Stomach, it dies soon, or becomes rancid and sour; the subtle Salts and Sulphur, or Spirits, are not in full Proportion intermixed with the Liquor to prevent the active Attraction of the different Principles, but either the few subtle Spirits are united again with the Salts, and so the Liquor turns sour, or they exhale and leave it vapid and dead. Very watry and insipid Apples yield a tasteless Cyder which soon become flat and thick, because the Salt and Oil of the Fruit bear no Proportion to its Phlegm; hence its Fermentation is languid, its Viscidities not broken, its Spirits quickly exhale, and its Tartar is so inconsiderable as not to preserve the Liquor. Cyder that has Water mix'd with the Apple Juice is liable to the same Fate, for the Water over dilutes the essential Salt and Oil of the Fruit.

Strong sweet Cyder is of the Nature of luscious, half fermented Wine, such as the *Portugal* and *Spanish*, which being more spirituous, and having a greater Strength, they load the Stomach and disorder the Head more, and afford less good nervous Juice than this Liquor, being only half fermented, and of difficult Digestion, so as sweet Cyder has a greater Proportion of Oil than Salts, its Oil is grosser, not attenuated and subtilized to a Spirit; it is therefore admirably fitted for very thin, lean Habits, because its Viscidity gives a Check to the violent Action and Attrition of the Muscles, and adds to the Opposition of the Blood against its Vessels, is not so easily digested, nor so quickly perspired. These Viscidities sheath the sharp, naked Salts of the Blood, which corrode and tear the small Vessels, and prevent the Stiffness and Rigidity of the Fibres by suppling them with their softening Oil. It is an excellent Drink in an Atrophy from an immoderate Waste of the Fluids by Perspiration, as it diminishes this Evacuation, and softens and relaxes the stiffened Fibres with its Oil. And in too great a Fluidity of the Body, from an excessive muscular Force, its Viscidities abate the violent Action of the Solids, and help the Blood to a better Consistence. Where the Blood abounds with too much Salt whose Particles have attracted and formed bulky Corpuscles, the Phlegm of this Cyder dilutes the Salts, and its Viscosity sheaths them when they are broken.

broken and divided into lesser Particles. It is admirably well adapted for Melancholy Constitutions, since its Phlegm thins the Blood, and its Oil softens the Fibres. It is a very good Drink for hard Labourers, or such as use much Exercise, because it supple and relaxes their Fibres and Vessels, affords some Recruit of Spirits, and goes but slowly off; and is therefore a proper Draught in clear dry Weather, when Perspiration is full and free.

To choleric Constitutions this Liquor is hurtful, because its Oil soon turns rancid in the Body, and occasions an oily Acrimony. Its Use is also unadvisable in very hot Weather, when the Solids are too much relaxed, the Blood too much rarefied, and the more fluid Parts are immoderately expended: So in foggy Weather, when the Spring of the Air is weakened or broke, and the Air in the Blood is short of its natural Elasticity, the liberal Use of this Liquor is in Danger to load the Body with crude, viscid, and indigested Juices, which threaten Fevers, Coughs, Colds, or Swellings of the Glands. Old People should forbear it, because their Perspiration being low, it must occasion Viscidities in their Blood, not easily to be got rid of; and as it has a Tendency to render the Secretions slower, and the secreted Juices more fizy, such as are subject to moist Asthma's, Catarrhs and Coughs, with expectoration of much viscid Phlegm, should be aware of it. The Sedentary and Studious should refrain it, seeing it affords not Spirits sufficient for invigorating and employing both the Organs of the intellectual Faculties, and voluntary Motion, and chiefly, because their Fibres become resty and weak thro' want of Use, and their Blood therefore fizy. Such as are much subject to Fear, Sorrow, Grief, or any of the depressing Passions, would do well to forbear its Use, because these Passions subtract from the Vigour and Tone of the Fibres, and add to the Force of the Fluids, till they become viscid, which Viscidity is still more increased by this sweet Cyder. It is very improper for phlegmatick Constitutions, which are liable to a Foulness and Swelling of the Glands, or a Stagnation of the lymphatick Juices, for it increases both the Laxness of the Solids, and an undue Mixture and Viscidity of the Fluids. Such as have weak, cold Stomachs, and bad Digestion, or much Flatulency and Crudity in the Bowels, or are afflicted with flatulent Cholick or frequent Stools of white and frothy Excrements, should carefully avoid it, for all half fermented Liquors, or such as have more Oil than Salt, whose Oil is gross, and the Salt not attenuated, but wrapt up in its viscous Coats, are highly injurious to such Persons, as they increase the Flatulency, and very much relax, weaken, and cool the languid Stomach and Intestines: For the same Reason, such as have Worms or other Insects, or their *Ova* ly-

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ing in the Body, should avoid sweet Cyder. Neither should those who have Palsies, Convulsions, Lethargy, Numbness, Night-mare or Cramps, make this their Beverage, since it both relaxes the nervous System more, increases the Viscidity of the Blood, and Penury of Spirits. Nor is it proper for them that are Goutish; or have arthritick Pains, (except from Acrimony of the Blood) because its Viscidities added to those of the Blood, must exasperate the Distemper. All intermittent Fevers and Agues forbid the Use of this Liquor; but the Apples of which it is made, such as *Kentish* and Golden Pippins, are an excellent Pectoral, ease tickling Coughs from a Sharpness of the Blood, and relieve Asthma's from Acrimony of the Juices, or Constriction of the Lungs; they are exceeding good in Consumptions, a fine Cordial, open the Body gently, and cool pleasantly, and are of great Service in hot, and dry, scorbutick, or splenetick Habits.

Rough Cyder is made of wild, harsh, or bitter Field Apples; these contain a deal of essential Salts, which break and attenuate the oily Parts in the Fermentation, by their intestine Motion and Collisions, they grind down one another into smaller Particles, rub off their viscid Coats, and separate the Cohesions of the viscous Part of the Liquor, so that the whole is more intimately mixed: This Cyder is therefore of a strong, pungent, stiptick vinous Taste, will keep longer, and is of more general Use and Benefit than the other; when fine, well purified, of a good Colour, and not lower'd with Water, it is better for Health than Wine, if moderately drunk: It is certainly preferable to the strong, heavy, luscious *Portugal* and *Spanish* Wines, which are but half fermented, and approaches near the Nature of *French* Claret. Nay, *Lemery* himself owns it to be more healthful, because its Spirits are not impetuous, nor so much agitated as those of Wine, besides they are detained and moderated by a great Quantity of viscous Flegm, which still contributes to make this Liquor moistening and cooling. The great Plenty of Tartar contained in this Cyder, renders it an excellent Stomachick; it dilutes and washes off the Slime, which adheres, like Glue, to the inner Coats, contracts and strenghtens the pall'd and relax'd Fibres of the Stomach, and gives a brisker Appetite and better Digestion; it is therefore a proper Liquor to be used against Belching, Stuffing at the Stomach, Nausea, or Vomitings, and for inappetent Women that are breeding. It is of admirable Service in all Loosenesses, Fluxes of the Belly, and immoderate Evacuations by Stool, because it cleanses and strengthens the Bowels, draws up their muscular Fibres, and contracts their relaxed weeping Glands; its Plenty of Tartar breaks and separates that Mucus which
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fills up or straitens the Mouths of the lacteal Vessels, and causes a Lientery, or discharge by Stool of the Chyle like Milk, together with the *Fæces*. It not only scours off the Slime from the insides of the Lacteals, which occasions a Toughness of the Chyle, but gently stimulates and invigorates these Vessels, and increases their Action and Force, so as to attenuate and prepare the Chyle much better before it be pour'd into and mix'd with the Blood. Being pungent and tart, it both scours and contracts the dilated Glands of the Throat and Trachea, and is therefore useful in Rheums and Catarrhs. Its a proper Drink for such as are troubled with white Swellings; and where the Breast is stuffed with thick Flegm, and the Vessels inactive or weak, it serves well to pump it up. Its Spirits being entangled by a viscous Flegm, and its Tartar plentiful and solid, it cleanses the Kidneys, Ureters and Bladder of Sand, small Stones, Slime and all gravelly Matter, which are only the Product of relaxed Kidneys, which strain off, or let pass thro' their excretory Ducts too large a Quantity of Salt and Earth, but wanting Strength and Motion to shake off, and send it to the Bladder, they give it a peaceable Lodging in the Pelvis, till the Earth and Salts attract, and are cemented with a Viscus or Slime, which is the first Embryo of a Stone. As it strengthens the whole solid System, invigorates the Fibres, which give a brisker Motion to the Fluids, whereby they are attenuated and mixed, made to pass the sundry Secretions, and fitted for Evacuations, it is certainly a noble Prevention of the Gout, and all arthritick Pains, which arise from a Thickness and Unfitness of the Humours for Motion, or a Sluggishness, Weakness, and Laxness of the Vessels. In intermitting Fevers, Agues, and other periodick, or erratick Diseases, which spring from a Siziness of the Juices, and an Inactivity or Indisposition of the Vessels and Fibres for Motion and Action, this Cyder is a most agreeable Liquor; for it both thins the Blood, attenuates the slimy Juice in the Capillaries, and stimulates their Channels. In Rheums and Distillations on the Eyes, involuntary Tears, Dimness of Sight, from the Thickness of the nervous Juice, or Weakness of the Nerves, it is very proper Drink for common Use: As also in Lethargies, Palsies, Apoplexies, Convulsions and Coma's its highly serviceable. And in Hysterick Disorders, this, or *French Wine* challenge the Preference of all other Liquors. In Corpulency, Cachexy, Leucophlegmatia, and Dropsies, it is of signal Service, if moderately used for ordinary Drink, because it thins the Blood, excites the Fibres and Vessels to Motion, accelerates Circulation, promotes Digestion, Secretion and Evacuation, especially Perspiration; and as it frees the contorted Glands

Glands and weak Vessels of their obstructing Slime, it also stimulates and contracts the dilated, lax and inactive Vesicles. And for these Reasons, Phlogmatick Constitutions, studious, inactive and valetudinary Persons cannot have a better Vehicle. Sanguine Temperaments will find it very serviceable, if moderately drank; and the Melancholy will reap much Benefit from it, because it gently stimulates, dilutes much, and does not quickly exhale or send off its Spirits; as for those who are much afflicted with the depressing Passions, they can have nothing better substituted in the room of *Champain* or *Burgundy*. Thus far of the Virtues of fine rough Cyder, well made, and long kept.

But as there is no Liquor which has not its bad Effects in some Cases and Constitutions, or is not sometimes prejudicial, so this is hurtful, if drank too new; it causes Flatulency in the lower Belly, from the Rarefaction and Attenuation of that gross Air which was shut up in the Viscidity of the Liquor; hence cholick Pains, Gripes and Costiveness; and from the abundance of its Viscidity, it fouls the Glands, begets Obstruction in the smaller Vessels, from whence several Diseases take their Birth. These Viscosities cleave to the Coats of the Stomach and Guts, lie between them and the Food, weaken Digestion, pall these *Viscera*, occasion an imperfect Chylification, and leave many gross, cold, and flegmatick Humours there, or send up some with the Blood to the Brain, and so beget nervous Disorders, or a Stupidity; if sent to the Liver, Obstructions and Jaundice ensue; if lodged in the Lymphatics, Leucoplegmias, and Dropsies follow; if they fall and settle on the Lungs, Stuffings, Hoarseness, and Shortness of Breath first, then a tearing Cough, and a difficult Expectoration of a Viscid comes on. And when this Cyder arrives at its Maturity, it is by no Means a nourishing Liquor for the mechanic and hard Labourer; because it consists of sharp tartarous Parts, which, together with the Action of the Muscles, attenuate and expel the finer and more nutritious Parts of the Blood too speedily. For the same Reason it shou'd be refrain'd in a Strangury, and its Use forbidden when the elevating Passions have fixt their Symptoms on us, such as Tremblings, too great Perspiration and Evacuation by Urine; then it increases the Contraction of the Nerves; but if lower'd with Water its an admirable Liquor in this Case, because weak Nerves soon fall back and languish after the Fit of Passion is over, and any viscid Draught is apt to pall them, and generate Obstructions in the weak Tubes; but the Tartar and stiptick Taste of the Liquor gives them

them a Pungeny, and preserves their Tone and Vigour. Very thin and meagre Habits shou'd not indulge the free and frequent Use of it; because its solid Parts abrade the Vessels, contract their Fibres more, and so keep, or make them leaner still. Such as are in an Atrophy should abstain from it; and such as live low, use much Abstinence, fasting or mean Diet, because it very powerfully promotes Digestion, Secretion and Evacuation. Neither is it adviseable in tickling Coughs, from a Saltness of the Humours, or Thinness and Acrimony of the Blood: In a Word, as its Use is highly serviceable in too great a Weakness, or Relaxation of the Fibres and Vessels, and too much Viscidity, Thickness, or undue Mixture of the Fluids, so its continued Use is hurtful where the Fibres and Vessels are too much contracted, stiff and strong, because it increases their Elasticity, or where the Blood is too much attenuated, and Perspiration immoderate.

Besides these we have treated of, there is another Sort of Cyder, which is sour, not thro' Age, hot Weather, or Accident, but from the Tartness of the Apples it is drawn from. This has a very sensible Acidity in it; and as all Acids cool much, stimulate strongly, and increase the Contraction of the Fibres and Vessels, therefore this Liquor is good for such as are troubled with an overflowing of the Gall; of Service in Gripes, Loosenesses, froathy, black, and fetid Stools, occasioned from much Bile; and in all Cases where an alkaline Acrimony is predominant in the Blood. It quenches Thirst, is a great Thinner of gross slimy Humours, and therefore very proper for corpulent phlegmatick Habits, to clean their Vessels, scour their Glands, prevent or remove Obstructions, glandular Swellings, and lymphatick Distensions. In hot, cholerick Constitutions, (if not very thin and lean) it cools and refreshes much, and is a palatable Drink. It stops bilious Vomitings, cures stinking Belchings and Indigestion, by strengthening the Stomach, bracing its Fibres, washing down its palling Slime, and contracting the dilated Strainers of the Liver. It is proper in intermitting Fevers and Agues, arising from the Grossness and Viscidity of the Blood, the Inactivity, Weakness, and Laxness of the Solids; the last is hereby briskly stimulated and excited to Motion, the first attenuated, its sundry Cohesions broken, and the whole Mass made more fit for Motion and Nutrition. In Inflammations and inflammatory Fevers it is a proper Liquor, if mixed with a little Water. In an Itch, Scurvy, or Leprosy, arising either from an alkaline or oily Acrimony of the Blood, there cannot be a better Liquor drank, for it powerfully
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checks both these, and very much cools the whole Mass. In arthritic and rheumatick Pains, from too great Thinness and Sharpness of the Blood and Juices, it is of singular Service; and to such as are liable to Hæmorrhages, its Use is adviseable, because it puts a Check to the Blood, which occasions its increased Velocity and impetuous Force against the Vessels, stimulates and contracts the small sanguiferous Tubes, and checks or prevents the too great Rarefaction of the Air in the Blood. But the exceeding Harshness of this Liquor makes it injurious to very thin Bodies, and unadviseable in all Acidities of the Blood, which are discoverable from a sour Taste in the Mouth, sour Belchings, gnawing Pain in the Stomach, &c. for it increases that Sharpness: In all great Constrictions of the Solids, it stimulates and adds to the contraction or crisping of the Fibres. In an Atrophy, it promotes and increases the Waste; and to hard Labourers, and such as use much Exercise, or feed on low mean Diet, it is a hurtful Liquor.

There is yet another sort of Cyder that is insipid, or has only a watry Taste, which is owing to the Prevalence of Water in the Fruit, far beyond the other Principles; either from the too luxurious State of the Plant, or from its being planted too deep in the Earth, its standing shaded from the Heat of the Sun, or from a cold wet Season; in all these Cases the Fruit is crude and watry, and never comes to that Perfection which a due Proportion of essential Salt and Oil would bring it to. This is the worst of all Cyder, highly pernicious to the flegmatick, aged, studious, and valetudinary, for it abounds with Viscidities, which render the Blood sily, and dispose the Body for many Obstructions, Swellings, Dropsies, Cachexies, Scrophula's, &c. It is only fit for quenching the Thirst of hard Labourers, Mechanicks, and such as use much Exercise, and these must use it sparingly, or expect to smart for it.

A Jack of Brandy mixed with a Bottle of Cyder, when its decanted is frequent in several Places, but Brandy is a needless Addition to rough Cyder; sweet Cyder is much better'd by it, and insipid Cyder highly requires it, before we can drink any Quantity of it with Safety, for above one half of the best Brandy being an inflammable Spirit (which will all burn away) that's only essential Salt and Oil; this subtile, volatile Salt added to that of Cyder, helps to destroy its Viscidity, and makes the Separation of its Cohesions and Digestion in the Body much easier, prevents that Flatulency, Belchings, Gripes, and cholical Pains, Sleepiness and Dulness, Pain at

the Stomach and Indigestion, which Cyder alone produces sometimes; it is no less useful to hinder Obstructions in the Vessels and Glands, Sickness of the Blood, Relaxation of the small Vessels, Corpulency and other Disorders which sweet and insipid Cyder are apt to cause, it is an admirable good Liquor for old Men, and will agree with most Ages, Constitutions, Climates and Sex, but Brandy makes it less nourishing and strengthening to Mechanicks, because it hastens the Dissipation of its finest Parts; insipid Cyder, with a little Brandy, becomes a very wholesome Liquor. The Weak, Valetudinary, Studious, Idle, Corpulent, or Cachectic, should refrain Cyder, produc'd in a very wet and cold Summer, unless they mix Brandy with it, and then it will be serviceable and wholesome for them.

Pears contain much Earth, Oil, and essential Salt, besides their Phlegm, whereby they strengthen the Stomach, create an Appetite, and are astringent; of them a Liquor is made call'd Perry, which I shall here consider, it is much of the same Nature of Cyder; it differs also in Respect of its Taste, Age, and making; it differs in Taste, according to the Fruit of which it was made, whether that was sweet, sour, harsh, insipid, or of mix'd Tastes. 2. According to the Degree, Perfection, or Imperfection of its Fermentation; by these you may find out its Properties in the same Manner as those of Cyder, which I discuss'd at large. Perry must not be drank before it be fine, because its viscid Parts have not subsided, therefore it weakens the Stomach, pall the Appetite, causes Flatulency, Gripes, and cholical Pains, the Spirits also which shou'd promote Digestion, invigorate the Vessels, and actuate the Liquor, are entangled and wrapt up in a gross Phlegm or Viscosity; but when the Liquor has stood a due Time upon its *Faces*, the gross, earthy Particles attract one another, and form larger Corpuscles than the Body of the Liquor in a State of Rest can support, or carry up any longer, but they fall to the Bottom and Sides of the Cask, where partly by the stronger Attraction of these gross earthy Cohesions, partly from the Subtility of the Spirits themselves, and their Disposition to Motion, they are extricated from the *Faces*, set at Liberty, and go into the Liquor again. Then is the proper time either to drink it, or draw it off into Bottles, for if it stands much longer, the Spirits are either absorb'd by the Cask, or exhale and leave the Perry vapid and dead, after which it soon becomes ropy and mothery; or if the Spirits be again united to the Salts, it is spiritless, and turns sour and undrinkable; of all Perry, that which had Water mix'd with it when it was made, spoils the soonest, and

and fines the least. Perry, because of its Tartness when fine, strengthens the Stomach and Bowels much, and is therefore a good Astringent or Binder, it washes off the Slime and *Mucus* from the Inside of the Intestines, opens the Passage to the Mouths of the Lacteals, clears them from all *Mucus*, or slimy Furring, invigorates their constituting Membranes and Fibres, scours the contorted Tubes of the Glands, unloads them of their adhesive and oppressing Viscidities, by stimulating, invigorating, and exciting the delicate Vessels to cast it off. 2. By the Solidity and Dryness of its earthy or saline Parts, which add a fresh *Momentum* to the Blood, and incide, break, separate, and divide its viscid Combinations. 3. By carrying into the Blood a Sufficiency of Phlegm or Water to dilute it and facilitate the Action of both Vessels and saline Particles. Perry is the best Liquor can be drunk after a Surfeit of Mushromes, especially if a Dram of Brandy be added to it, then it is reckoned a better Antidote than either Wine or Honey, both which contain a very fine Oil, subtilized to a Spirit, which entangles the acid, volatile, coagulating, and malignant Salts of the Mushromes, and the delicate essential Salts of the Liquor, penetrate, separate, attenuate, and divide its tenacious spongy Parts, which two, *viz* the acid and coagulating Salts, and the spongy tough Substances, passing together with the Chyle into the Blood, and getting into the small Vessels of the Lungs, stuff and distend them with both a tough, coagulated, and malignant Blood, which occasion Suffocation, Strangulation, and Death; hence those Mushromes which have the least Salt and most Oil are the least dangerous, for the last fetters up and entangles the first, so as it is not so volatile, separable, and mischievous as it would otherwise prove; *è contra*, the more Salt and less Oil, the more dangerous; therefore such as degenerate from their natural Colour after they are washed, and become Blue or Black, are the most fatal, because they contain the most acid coagulating Salt. It is from the Redundancy of this Salt in them, that if they be let lye some Days after they are gathered, before they be dressed and pickled they undergo a Kind of Fermentation, wherein their Salts which were bound up in their viscous and spongy Parts, slowly and insensibly extricate and free themselves, shake off their Fetters, take to them their full Forces, and become a Poison; but whilst the Salts were closely tyed to the Oil and Sponge, were less dangerous; therefore Mushromes brought up on Dung Beds having much Sulphur in them are more safe than others. It is for these Reasons that *Dioscorides* divides them into two Classes, one whereof he ranks among the Number of Poisons; and *Pliny* is highly displeased with the Luxury of Mankind who will gratify their Palate.

late in the eating of them at the Peril of their Lives. *Nero* called them the Food of the Gods, because his Predecessor *Claudius*, who died with eating of them, was deified. And *Lemery* says they are a Sort of Victuals we cannot be too cautious of, seeing the best of them are sometimes pernicious, and every Day whole Families are brought to their End by eating of them. Perry is made after the same Manner, and has near the same Properties as Cyder; the best is that made of tart or harsh Pears; it has a Colour and Taste like *Rhenish* Wine, and has much the same Vertues as rough Cyder, but Perry is the more pleasant, and revives and refreshes more, is very diuretick, cools much, and is therefore very injurious to such as labour under flatulent Cholicks, Obstructions of the Liver, Pancreas or Mesentery of a schirrous Nature. Either Cyder or Perry have their Virtues highly exalted, their Viscidities much broken and rendered much better for Use, if Sugar, Nutmeg, and Ginger be put up with them, these prevent their Crudity and Flatulency.

I have discoursed at more length upon Cyder, because, next to Malt Liquors, it is the chief Product of our Isle, and a Drink that is most used in several Western Countries in *England*, and often called for in hot Weather over all *Britain*.

Of MEAD, METHLEGIN, and HYDROMEL.

THESE Liquors are much used in the northern Countries where great Cold hinders the Growth of the Grape and Production of Wine; but kind Nature has bountifully provided them with Honey, which they make into a spirituous Liquor with Water, and esteem it as much, yea some prefer it before Wine; all these three are made with Honey and Water, and some Aromaticks, as Cinnamon, Ginger, Nutmegs, Cloves, &c. and fermented with Yest after boyling; the last is only Honey and Water boyled and barrellled close up without Fermentation. These are the chief Drink of *Russia*, *Muscovy*, *Lithuania*, and *Tartary*, and several good Housewives in *Britain* prepare and keep them yearly. Fermented Mead having the essential Oil and Salts of the Flowers from which it is gathered, broken, mixed with the Water, and reduced to subtile, volatile Spirit, becomes of the Nature of Wine when it is kept to a right Age, *i. e.* till it be clear, fine, and of a pleasant vinous Taste, which if right made, it must be, considering that Honey is only the most essential, subtile, and fine Parts of Flowers, and for this Reason Mead must be a very wholesome Liquor, because it is a curious and chymical Collection of the best Principles of aromatic and

and cordial Flowers. Mead must be an excellent nervous Wine, increase the animal Spirits, and inflate the delicate Tubes with its volatile and exalted Parts, fit them better for vigorous Motion and Action; and as it affords plenty of nervous Juices that will supply the Nerves of involuntary Motion, strengthen the Heart, promote Circulation, and prove a great Cordial, far beyond Brandy, *Aqua vitæ*, or *French Wine*, because their Spirits being stripped of their mucous Phlegm and left naked, they soon exhale and leave their Phlegm to thicken the Blood, load the Vessels and weaken the Fibres, but the Spirits of Mead and Methlegin, being still more wrapt up in the oily Parts, continue longer in the Body, invigorate the Solids, and keep them longer in Play. *French Wine* indeed has this Advantage, that it abounding with Tartar, that Tartar gives a greater stimulus to the Vessels, and by its roughness corrugates and draws up the Fibres more, whereby they become stronger, and keep their Tone longer, even when its Spirits are spent. It also abounds more with subtile fine earthy Parts, which nourishes and makes up the Waste and Abrasions of the Vessels. For these Reasons Mead approaches nearer the Nature of *Spanish* and *Portugal* Wines, only it has less Earth, and their Earth is too gross to answer the End of true Nutrition. Mead is excellent in all Languishings and Decays of Nature; it is a Milk for old People, a great Strengthenener of the Solids of the Phlegmatic, an Attenuater of the Blood, an Invigorater of the loaded abdominal Vessels, and a powerful Reviver of the Spirits of melancholy Persons; as Cyder is chiefly adapted for Summer Service, so is this for Winter Uses; as Cyder is to be drunk with Meals, and as an Afternoon cheering Glass, so this answers best a morning Whet. It is a powerful Diuretick; cleanses Kidneys, Ureters, and Bladder of all sandy, fabulous, mucilaginous, gravelly, and exotic, tardy Bodies: As it affords Plenty of animal Spirits which invigorate the Nerves and Fibres, they attenuate, mix, and prepare the Blood for Secretion and Excretion, by this Property, and its Multitude of essential Salts, it scours the Glands and Lymphatics, cleanses away the Viscidities of the Blood; it fortifies the Stomach and promotes Digestion in the Bowels, by its gently stimulating the muscular Fibres, attenuates the Viscidities lodged in the Glands, and affords nervous Juice. But Hydromel, that is, Honey and Water boil'd, and kept unfermented, with Cinnamon, Ginger, and Nutmegs, is a powerful Cleanser of the Lungs; it helps Expectoration, and sheaths the sharp prickling Salts which tickle the trachæal Glands, for it not having undergone Fermentation, abounds with many, oily Parts and Salts, which

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not being so minute and subtile as in the other, prick not, nor stimulate the Nerves and Glands, neither are the oily Parts so gross as to cloy and load the small Vessels of the Lungs, but soften and smooth them, sheath the sharp irritating Salts, and smooths the Insides of the Vessels with a noble balsamic *Litus*, which defends them from Pungency and Irritation, till they recover Strength and Elasticity, whereby they shake off and propel any viscid or saline Moisture which might stuff, load, or tickle them. Thus is Honey and Mead of unspeakable Service to the Diseases of the Breast. And also where the Bowels are sluggish and inactive, and do not answer, or where they are too dry and stiff, want glandular Moisture to expedite the Passage of the *Fæces*, this Mead is good, because its gross Salts prick and stir up the Intestines to their Office, or its gross Oil lubricates and softens them, causes the Glands to give Way to the Impulse of the circulating Blood, and their excretory Ducts are softened and widened; hence a larger Quantity of intestinal glandular Juice, whereby Stool is provoked. But vinous Mead has not this Effect, because the Fermentation has subtilized its Oil and Salts so much, that they readily get through the first Passages into the Blood, without producing that Effect. The *OEnome-li* (*i. e.* Wine and Honey mixed) of the Antients, will still make the Wine more pectoral, *i. e.* the Oil and viscid Parts of the Honey will obtund, or sheath up the Tartar of the Wine so as it will not prick nor tickle the Glands of the Throat, to excite a troublesome Cough; the Wine on the other Hand will make the Honey more cordial stomachic, and of quicker Digestion.

Mead and all Preparations of Honey are most disagreeable to choleric Constitutions, because it soon degenerates into the Nature of Bile, causes terrible Gripes, bilious Cholicks, and not seldom Death; it is also hurtful in ardent Fevers, because its Spirits will increase the violent and impetuous Motion of the Humours, and exasperate the Disease. It is no less unsuitable for hot Summer Weather, because then the Solids are lax, Digestion slow, and it lying on the Stomach meets with the Biles and turns into an Acid, which presently raises a violent Cholick, so that as Cyder is adapted for Summer, so is this for Winter. Mead drunk before it be fine, palls the Stomach, goes slowly off, causes Belchings, Flatulency, Indigestion, *Nausea* and Vomiting, from the Viscidity it had not yet deposited, wherein the contained Air rarefies, expands, and causes an Explosion, and these Viscidities meeting with the Bile, easily turn into the same, and so cause bilious Vomiting, Pain in the Bowels and Looseness; and because it contains
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both much Spirit and viscous Parts, it easily causes Drunkenness, hard to get off.

Of BIRCH WINE, GOOS-BERRY WINE, COW-SLIP and ORANGE WINES.

BIRCH Wine has long Time deservedly obtained and retained its Character in the World, for it is full of a very delicate Salt or Tartar mixed with a very thin Phlegm, has little of that Viscidity in it which makes all other made Wines so flatulent and unwholesome; it is of the Nature of *Rhenish* Wines, its solid naked Tartar or Salts make it highly serviceable in several obstinate Disorders, as, in any Loading, Stuffing, or Infarction of the renal excretory Vessels, or Lodgments of small Stones, Gravel, Sand, or Slime; it dilutes the lodged Matter, increases the Quantity of Urine, stimulates and invigorates the Vessels to shake them off, dislodge and expell them, and so cleanses and clears the Channels, and frees the Drinker from much Pain; because of the Minuteness and Solidity of its Salts, and Thinness of their Vehicle, it dilutes a fizy Mass of Blood, dissolves its viscid Coagulums, washes off the Slime and *Mucus* from the Insides of the Vessels, clears off Obstructions from the Glands, opens the obstructed Channels, and adds a fresh *Momentum* to the Blood; and because its Salts stimulate the Vessels, and also its Spirits afford Juice to the nervous Tubes, the Solids are invigorated, strengthened, and act with more Force and Briskness over the Fluids, whereby the last are attenuated, mixed, fitted for Secretion, Excretion, Nutrition, and Evacuation. And as it both irritates and raises the Solids, dissolves and mixes the Fluids, scours the Glands, and provokes Urine, it comes in good Play against Dropsies, Cachexies, an indolent and bulky Habit of Body. When the Blood is fizy, sluggish, and inactive, and the Lungs unable to repeal its Settlement, and loading their slender Tubes with a thick, viscid Phlegm, either in the tracheal or pulmonary Vessels; the first causing a Cough, and difficult Expectoration of a thick, tough Phlegm; the second a Distention, Dilatation, and invincible Load of fizy Blood, disposing the Lungs to Tubercles, Hydatides, or Impostumation; the Tartar of this Wine cuts, separates, and dissolves these Viscosities, excites the Vessels to put forth a great Force, Action, and Elasticity, and

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at the same Time its pure Phlegm dilutes the Blood, thins the Humours, and disposes them to be thrown back into the Vessels and Blood, till they be reduced to a subtile Matter fit for Perspiration, or Evacuation by Urine, and then they are expelled and the phthifical Person restored; for this Purpose it excells *French Claret* (tho' the thinnest of all red Wines) because the last has too great a Restringlycy or Stipticity in it, whereby it contracts the Vessels, makes them narrower, and shortens their Diameters, as the viscid Cohesions are rather wedg'd in, and the Disease made worse. It exceeds white Wine also, for this has too much and too naked Tartar, which sheares, abrades, and wastes the Vessels, till it bring the Body into a Cachexy. But of all Birch Wine, that is best for this Purpose which has a Quart of Honey added to each Gallon of Juice. As Birch Wine is a great Diuretick, it is very serviceable in a Strangury, or partial Obstruction of Urine from a Viscidity of the Blood, or Infarction of the Parts, because it clears the Passages, removes the obstructing Causes, and brings off Urine freely. It is of good Use in scorbutick Habits, contracted by Intemperance, an unequal Mixture or Siziness of the Blood for these Reasons. It is also a good Gargle for tumefied Tonfils or Glands of the Mouth, causes Spitting and Discharge of much ropy Phlegm. In a Word, it is the most inoffensive and truly useful of all our factitious Wines.

But seeing it is so powerful a Diuretick, Thinner of the Blood, and Promoter thereby of Perspiration, it is injurious to very thin, lean, and hectic Bodies, because it promotes a Waste and Atrophy too much. Neither is it to be used in a Strangury from the Saltness and Sharpness of the Blood causing an Inflammation of the Parts, and Heat and Scalding of Urine; for all Diureticks stimulate those Parts, encrease the Afflux of Blood to them, and exasperate the Symptoms. It must also be refrained in a *Diabetes*, seeing it is neither restraining, anodyne, nor balsamic, and so cannot thicken the Juices, nor contract the Strainers. An immoderate Flux of the *Menses* forbids its Use, seeing it stimulates the Parts, thins the Blood, and promotes the Evacuation. Too keen an Appetite calls for greater Blunters, and not such a brisk Fortifier of the Stomach. Too great a Fluidity or impetuous Motion of the Blood make its Use suspected, as promoting both these. Too much Labour, Exercise, or Evacuations render its Use hurtful, because it is too thin, and stimulating, and depauperates the Body too speedily of its nutritive Juices. Too low a Diet, except of tenacious Foods, agrees not with this Drink. Gooseberries contain very much

much essential Oil and fine Salt, besides their Phlegm therefore affords a good Wine and the best Brandy our Island makes. This Fruit when green, abounds with acid Salt and much Earth, which give them that sour, stiptick Taste, and make them pungent on the Tongue, but as they ripen, the Oil abounds more, unites with and sheaths their Salts, then are they less astringent, more viscid, have a better Taste and turn sweet. Gooseberry Wine made of the Berries before they be full ripe, well fermented, and kept several Months till it is clear and fine, is a most delicious, cooling Summer's Draught adapted especially to young Persons, and the bilious (and sanguine) whose Bodies from the Thinness, Equality, and rapid Motion of their Blood and Force of their Solids are easily over-heated, and too great Waste by Perspiration promoted. From the Abundance of its Salts and Oil it becomes very spirituous; but its Salts being a little acid, it is tart, and thereby pricks the Stomach, promotes Digestion, helps Nausea, Belchings and Vomitings; for the same Reason, it purses up the pall'd and too much relax'd Solids of the Body, invigorates the Force of the Fibres, keeps the Blood in better Play and Mixture, prevents its running into viscid or grumous Cohesions, or being too profusely perspired through the relax'd Skin; and mix'd with Water it makes a very agreeable, sharp Drink in ardent Fevers, especially where an alkaline Acrimony prevails in the Blood. It quenches Thirst, and where the Blood is too fluid, or rarefied, it checks its Rarefactions, and gives it a better Consistence, or the Juice of the unripe Fruit mix'd with Water or boil'd in Drink, stops a Looseness in Fevers, and is a great Astringent in spitting of Blood; it is also good in putrid Fevers, or where there is a Tendency of the Parts to a Mortification: It is no less serviceable against such Poisons as rarefy the Blood, relax, dilate, and distend the Vessels beyond their due Tone, as Poppies, Opium, &c. or for such Poisons as leave a Viscidity, or render the Juices tenacious, and stupify, as Hemlock, Henbane, &c.

But, both Berries, Wine, and Decoction, are injurious to the Melancholick, because of their Acidity and Stipticity, which corrugate their Fibres, and thicken their Blood; they are also disagreeable to such as have a gnawing, corroding Pain at their Stomach, from an acid Humour too plentifully pour'd in, or skulking there; they are apt to raise a severe Cholick, where they are used by those who have an Acidity of Humours in their Bowels, or where the Blood is too acid, they thicken it more.

Currants have little Oil, but much Salt and Phlegm in them; they afford a Wine, that, when it has been bottled two or three Months, is

of a good Body, delicious Taste, a beautiful ruby Colour, and rich. It is a delicious cooling, moistening Drink in Summer, and by its Tartness it corrugates the muscular Fibres of the Stomach, and helps Digestion; its Salts make it a good Detergent, (if not overloaded with Sugar, or ill fermented, or drank before it be fin'd) it purges up the relax'd Fibres in very hot Weather, and checks too great a Perspiration; or if the excretory Ducts of the Skin be so pall'd, that they cannot expell their contain'd Matter, but its Thickness and more viscid Parts furr up the Channels, it stimulates the Fibres, cuts and divides the gross Humours, and promotes a slow Perspiration. It is good to check the Redundancy of the Bile, by its acid Salts, and by its Restrictingency it contracts the Strainers of the Liver, and makes the Vessels narrower, so as less Bile is separated and poured into the Intestines, and more of it discharg'd with the other Humours by the Skin. It is good also against an oily Acrimony in the Bowels or Blood, nidrous Stinking, oily Belchings and Loathings. It is proper in a Fullness and Stuffing at Stomach, and a Weakness and Laxness of the Bowels. A moderate Glass of that which is old, strong and fine, agrees with phlegmatick, unweildy Bodies, because of its Plenty of Salts. It is no less useful to the Cholerick, as its Fluidity mixes with, and corrects the Bile, and prevents the too great Acidity and Rarefaction of the Blood, for the same Reason it is good after Laudanum, Opium, or too great a Dose of Poppyseeds, or any stupifying Poisons. It is a proper Drink in a foggy, close, sultry, hot Weather; it is chiefly adapted to Youthhood.

Melancholy Tempers cannot so well bear it, for the same Reason that Goosberry Wine disagrees with them; neither is it eligible in cold Weather, because it chills too much, and as it cools, moistens greatly; old Age should not use it, for their Circulation and Heat is languid, and their Perspiration answerable. In Pains of Stomach or Bowels from an acid Humour, it is hurtful, being full of acid Salts; and all Disorders from Acidity of the Blood are encreased by it; therefore arthritick or rheumatic Pains from a Sharpness of the Blood, are exasperated from its Use. And Diseases arising from a Thickness of the Blood forbid its Use.

Cowslip Wine has a grateful enough Taste; it is cooling from the Lemons added to it; it is a proper Draught for the Summer Time; it is also good in great Anxiety, Restlessness, and Tossings, being of a soporific Nature, and gently composes to Sleep. It's also a little detergent, and promotes Expectoration, somewhat cordial and a little stomatick, the last is owing only to the Lemons. But it is very viscid,

cid, and therefore occasions Flatulency in the Bowels, therefore such as are liable to flatulent Cholicks should not meddle with it. If drunk too freely, it taints the Blood with a Viscidity, which fouls the Glands, furs the Channels, and begets Obstructions; the Sugar and Lemon make it a little diuretic; phlegmatic, unwieldy, cachectic, and hydropic Persons, or such as are liable to Obstructions of the Glands, and white Swellings should not touch it, both because of its Viscidity and soporific Tendency, which relaxes the Solids, which should be drawn up, strengthened, and invigorated. It is naught for old People, whose Juices are already too thick, and their Perspiration too flow; a Foggy Air, rainy Weather, and marshy or wet Places forbid its Use, because it relaxes more, and adds to the Indispositions arising therefrom. Its Use is chiefly to please the Palate at the Expence of running the Venture of some bodily Disorder.

Orange Wine has a pleasant Taste, is a lesser Kind of Cordial, and strengthens the Stomach, by stimulating softly, and drawing up its Fibres, and begets a better Appetite. It is chiefly useful in a Morning, to wash off the Slime from the Stomach, raise its Tone, and correct the Plenty of Bile; it is somewhat diuretic; but this is also liable to Viscidity, and so may cause Gripes, and cholical Complaints, both from its Coolness and Viscidity, is therefore no ways fitted for a cheering Cup; it is best in Summer, or hot and dry Weather, to bilious young People, but not suitable to the aged, phlegmatick, and cachectic Constitutions.

Elder Wine is another excellent factitious Wine, which must not be forgot, for did either my Design or Time allow, I could write a whole Book of different Sorts of Wines which might be made from the sundry Parts of this noble, simple, and despised Shrub, which though the most hated, and most industriously rooted out of both Gardens and Fields, is yet the most useful and medicinal of all others, to human Bodies: Bountiful Nature having provided it as a *Panacea*, which affords Relief to the most Diseases we are liable to, and that with little Labour and Expence, which should make us admire it and value it the more. Elder Wine differs in its Properties, according to the Ingredients wherewith it is made. That made with Raisins of the Sun is more sharp, thinning, cleansing, moves the Belly, and opens Obstructions more; that made with *Malaga* Raisins, is more healing, pectoral, soft, smoothing and sweetning, because they are much fatter, abound with Oil and Balsam. But that made of only the Juice of the Berries, boil'd and scum'd, and Sugar put to it and fermented, barrel'd
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up, well settled, then bottled off, and a spoonful of good Brandy put to each Bottle, is the richest, strongest, and best Wine I ever drank; it will keep good many Years, and has the true Virtue of the Elder in it, because it is not chang'd by long and high Fermentation and Distillation; for these separate and subtilize its Spirit, alter its natural Properties, and leave it no other Virtue but what is common to other spirituous Liquors, however some may boast of *Arcana's* to bubble the Ignorant out of their Money. But seeing this Wine is mostly made with Raisins, I shall consider first the Virtues of them, then of the Berries. Raisins are both softening and adhesive, and have a special Activity and Disposition to Motion, when join'd with a suitable Configuration of Parts; by the first of these, they thicken the too thin and serous Humours, soften the saline, sharp, and tickling, check the impetuous Motion of the Blood, from a Sharpness, Pungency, Nakedness and Multitude of its Salts, which they sheath, blunt, or absorb; and by their last Property they are possess'd of subtile Parts which are proper to mix with, attenuate and carry away the Contents of Abscesses and Ulcers; they also abrade and take along with them, those mucous and viscid Collections of Humours, which adhere to and obstruct the Vessels. The first of these makes them excellent in sharp troublesome tickling Coughs, arising from too great a Serosity and Saltiness of the Blood, because they sheath up and blunt its Acrimony, make it thicker, of a more equal Temper, and give it an adhesive Quality, whereby it is more nourishing, soft, and balsamick, and affords a soft, oily *Litus* to the naked, or abraded Vessels, induces a more indolent and pacific State to them, their *Stimulus* being check'd or remov'd; for the same Reason are they no less suitable to scorbutick Habits, where there is much Acrimony in the Blood discover'd by great itching, cuticular Eruptions and Erosions, Tetters, Erisipelas, &c. because they, by sheathing the Salts, remove the *Stimulus* of the Vessels, prevent their Abrasion and Consumption, therefore are they deservedly reckon'd among the Sweetners of the Blood, and suited to lean, thin, hectic, scorbutick Bodies. The rise of a Cough from the Saltiness; Sharpness, and Serosity of the Blood is easily known, from the constant, uneasy Tickling of the Throat, from the Thinness of the Spitting, it is also often sharp or salt, from the Quickness of the Pulse, from the Liveliness and Briskness of the Person's Constitution; and lastly from a Roughness perceived in the Throat and Breast; by this Disposition they are very useful in Catarrhs, which come from the Thinness and Sharpness of the Juices, and their pricking of the Vessels,

sels and running speedily through them; for the Secretions are diminish'd by an accelerated Circulation, yet as true it is, they are increased by the Thinness of the Blood, Excoriation or Abrasion of insides of the Vessels, and the Briskness of Circulation, attended with a constant Irritation of the containing Tubes. Hereby they come in Play for rheumatick or other fix'd or erratic Pains, occasion'd by the Thinness and Saltness of the Blood, for by the first, its globular Parts being less, it enters the smaller Vessels, which being conic, it must stop, till by their Force it be attenuated; during this Delay, its Salts attract more, and act with a stronger *Stimulus* upon the Capillaries, whereby they contract, straiten, and hinder the free and ordinary Circuit of the Blood. Hence an Action of the Blood against the Vessels, and of them against the Blood, and of the Parts of the Blood against one another, till the thinner Parts escape, and the thicker are stopt, which is the Cause of the Inflammation and Pain of the Parts; but the *Periosteum* and Membranes about the Joints, having the smallest Vessels most sensible, and least dilatable, they will be the most sensible, fittest, and most susceptible of this Misery. Pains from this Cause are discoverable from the Signs of a dissolv'd, sharp, and salt Blood, and also by Night Coughs, slow Fevers toward Evening, and Defluxions on some Parts; because of their temperating and sweetening the Blood, they are useful in Leprosies, Scurff, and Dandriff, of Head or Body; their softening, sheathing, adhesive, and pacific Quality makes them a fit Ingredient in Venereal Cases, where the Juices are very salt, and the Parts heated, excoriated and pain'd; for the same Reason they are justly join'd to Decoctions, against hot Rheums falling down on the Eyes, or a gnawing Pain of the Stomach, from too much acid *Saliva* spued out by its Glands, or in Cholicks from acid Salts, pricking, stimulating, and inflaming the Intestines; but in all these Intentions, *Malaga Raisins* must be prefer'd. Raisins, by their attenuating and deterging Property, are highly necessary and useful in promoting Expectoration and dislodging Viscidities in the *Bronchia*, and cleansing away the adhesive *Mucus* which lines and loads either tracheal or pulmonary Vessels, and as they are serviceable in attenuating, mixing, throwing back into the Vessels, and carrying off the stuffing or obstructing Slime or *Mucus* in the Lungs, they act the same kind Part to the Kidneys and urinary Passages, cleanse them from Sand, Gravel, Slime, or small Stones, take off also that adhesive Viscidity which furs up, straitens, or obstructs the renal secretory Passages, and so prove Diuretick. Hereby they are beneficial in Stuffings,
Straitning,

Straitning, or Obstructions of either hepatick, splenetick, pancreatic, or mesenteric Vessels, where a slow and weak Circulation, a tenacious Juice, or a lax Fibre, has caus'd a furring up of the insides of these Vessels. In an Asthma, from an Infarction of the Vessels with thick or tough Phlegm, they attenuate, cut and prepare it for Expectoration, and gently invigorate the Vessels against receiving such a Load; they are also good in great Hoarseness from a Load of fizy Juices upon the tracheal Vessels; for these Reasons they are greatly profitable in hydropic or cachectic Disorders, where from the Thickness of the *Lympha*, its Indisposition to Motion, and the Weakness, Laxness, and Distention of the Vessels, the Lymphaticks are burden'd; they are a fitting Ingredient in Meat or Medicine, against Collection of Matter, Defluxion or Apostemation in any particular Part, or in any great Flux of thick viscid Matter upon any Ulcer or Sore, which prevents its healing; in antiscrophulous Intentions they claim a Right of Assistance; in the *Fluor Albus* they help to scour and contract the relax'd Glands and sweeten the Blood; but in all these Intentions we must make choise of Raisins of the Sun. Raisins are injurious to the cholerick; but agree better with the aged, weak, hectic and thin. Elder Berries contain much Oil, some volatile Salt, more fix'd Phlegm and Earth; they are more acid than Dwarf-Elderberries; the Juice of the Berries is not only medicinal, but being made into Wine, fermented and kept till it be fined and clear'd, is a delicious Liquor, whose Oil and Salts being attenuated and ground down from their gross *Moleculæ* by its intestine Motion of Fermentation, afford much nervous Juice, and animal Spirits; its fine terrestrious Parts at the same time help to supply the Waste of our Bodies sustain'd by Labour, Exercise, Watching, or Fasting; its gross Oil lubricates the Springs of the Fibres, supply such as are dry'd and parch'd, or too much contracted, corrugated, or convulsed. It sheaths, or blunts also the Salts of our Blood, when they are too sharp, naked, or much; or if the Blood be too viscid, fizy, or gross, the Salts in the depurated Wine incide, attenuate and separate its Cohesions, fit it for a brisker, fuller, and more equal and universal Circulation, whereby its nutritive Principles are separated and set at Liberty, from the gross and useless Parts wherein it was entangled, and helps to expel the excrementitious Juices; not only do the Salts cut and divide the grosser Parts of the Blood, but they add a *Stimulus* to its containing Tubes, whereby they exert and act with greater Force, swifter Motion and Elasticity, which not only adds to the Ballance of the Solids against the

the Fluids, but to the better Mixture of the Blood, and prevents that Attraction of its grosser Parts, which it always discovers in a slow Circulation; and to all these Advantages of the Earth, Oil, and Salts, the Phlegm adds its Assistance, being a Vehicle to carry them into the Blood, and promote their Usefulness there. Elder Wine suits the thin, lean, hectic, hypp'd, aged, corpulent, cachectic best, especially in Winter, cold Weather, or temperate Air; it is less agreeable to the Choleric, especially in very hot Weather, lest it encrease the Quantity of Bile, and procure Gripes or bilious Cholicks.

But let us consider it a little in a medicinal Light, and that only as it is a Drinkable, because should I consider the sundry Preparations afforded by the Elder-Tree, both for internal and external Intentions, I should wander from my Purpose, and enter a large Field. This Juice abounding with fixed Salt is admirably fitted to cleanse and pass off by the renal Glands, which gives them a *Stimulus*, encreases the Motion of the Blood in them, and at the same Time accompanied with a softening anodyne Oil, which lubricates the Vessels, prevents any sensible Irritation from the Salts, therefore will it be a notable Diuretick, provoke much Urine, and cleanse the Ureters, Kidneys, and Bladder from fabulous Matter, small Stones, Sand and Gravel: Because whatsoever irritates the urinary Passages, calls a greater Afflux of Blood to them and the circumjacent Parts, not only this, but the *Momentum* which the fixed Salts add to the Blood, and the Rarefaction thereof by the volatile Salts; therefore does this Wine provoke the *Menses*, when obstructed either by a Toughness of the Juices, or great Scarcity in the uterine Vessels, or the Resistibility, Contractedness, or Flaccidity of the Tubes themselves. As it encreases the Afflux of Blood thither, and fills the Vessels, therefore is it a fit Draught where the *Lochia* are suppressed, or the Secundine retain'd, as also in weak or slow Labour. As it irritates the Kidneys and urinary Channels, it is good in any partial or total Obstruction of Urine. Its powerful Operation upon the urinary Passages was carefully observed and admired long since by *Forestus*, *Petræus Nosolog.* *Mathiolus*, *Mullerus*, &c. Its Emmenagogic Virtue is proved and applauded by *Quercetan*, *Gabel Shover*, *Dioscorides*, &c. who also found the Success of sundry Preparations of the same Shrub in curing the *Menses nimios*. This Juice having plenty of Salts and Oil, the first makes it a great Opener of Obstructions in the Liver, Spleen, Mesentery, *Pancreas*, and other Parts, and so a great Cure of the Jaundice, Dropsies of all Sorts, Cachexies, Leucophlegmatia's, and Scurvy, for which Intentions it comes to us re-

commended by *Mindererus, Quercetan, Dioscorides, Forestus, Crollius, Blochwich, Nicholas, Mullerus, Benedict, Veronensis, &c.* as it cuts and thins gross, thick, earthy Humours, stimulates their Vessels, and gently eliminates the atrabiliary Matter by Stool, and at the same Time refreshes the Person, elevates his Spirits, and invigorates him, it must be highly serviceable to melancholy Tempers. Not only is this Juice an Alterative, but a gentle Purgative, and Provoker of Sweat; by the first it carries off the *Colluvies* of Water from the Belly, purges Phlegm, Choler, and Serum, eases the burden'd Lymphaticks of their Load, by its first attenuating the fizy Serum and then purging it off. As it is a Sudorific (which is owing to its volatile Salts) it is good in obstructed Perspirations, or in Colds therefrom, or in intermitting Fevers after a Vomit, because it encourages Sweating, attenuates and breaks the gross Humours, disposes the Urine to deposite its Sediment, prepares the Body sooner and with greater Safety for the Bark. In time of the Plague or other epidemic Diseases, a Glass of this Wine is good before Dinner or Supper; *Aljunus* says the *Ægyptians* use the Oil of Elder thus, they dip a Sheet in it, then squeeze it out and wrap up the infected Person in it, and so lay him in bed to sweat, whereby they cure Multitudes; they promote and ripen the Buboës with a Cataphlasm of Elder Flowers and Honey, or a Liniment of their Oil, Honey, and *Sal Armoniac*. With Powder of Elder Flowers and Leaves, or with roasted Onions and Rob of Elder; or of Elder and Borrage Leaves, Mustard-Seed, and rancid Nut-Kernels; when the Ulcers are broke, they dress the Ulcer with Juice of Elder Leaves and Honey, or Oil of Elder Kernels and Turpentine. In pestilential Fevers the Juice is no less useful as it promotes a *Diaphoresis*, fortifies Nature, refreshes the Spirits, and is an Antidote against Infection; for its Vinegar is a Preservative in Health, and destroys the Exhalations of Diseased Bodies. In burning Fevers this Vinegar, with a little Sugar, and mixed with Water, cools much, cuts the gross and tough Humours, opens Obstructions, quenches Thirst, refreshes, and cleanses off much Humours. *Aljunus* says that Elder-flower Water or Wine is the most excellent and familiar Medicine used by the *Ægyptians* in the Small-Pox. The Oil of the Berries is exceeding softening and anodyne, therefore is a Fomentation of its Flowers admirable in pain'd, swell'd, or inflamed *Hæmorrhoids*. This Wine cures Fits in Children, by evacuating that black, yellow, putrid, or acid Matter which laid in the Belly, pricked and pained the Bowels. It is also proper Drink for the Nurse in this Case to take off the Sharpness, Saltness, or Serosity

Serofity of her Milk. These come to Age will find their Advantage in using it, to sweeten the Blood, provoke Sweat, open the Belly, afford nervous Juices, and check the irregular Incurfions of the Spirits into some Nerves and Muscles. Its volatile Salt and Spirit, and sudorific Property make it serviceable in Apoplexies and Palsies. As it provokes Sweat, actuates the Blood, cleanses the Glands, and affords nervous Juice, it is good in Dullness of Hearing or Deafness from gross Humours, relaxing the Drum of the Ear, or loading the auditory Nerves with gross fizy Juice, as it thins the Blood, scours the Glands and purges off serous Humours; for the same Reason it is proper for Rheums on the Eyes. It cleanses, dries, and heals Inflammations, Tumours, or Ulcers of Nose, Mouth, or Throat, because it sheaths the Salts, deterges the Vessels, sweetens the Blood, and causes a *Diaphoresis*, therefore it is good in Scurvy, Leprosy, Scales, or Dandriff. In Blood Spitting it thickens the thin Blood, sweetens the Salts, and affords Balsam to the Vessels. In an Asthma or Difficulty of Breathing from a Stuffing of the Lungs with viscid Phlegm, or from the Sharpness of the Blood contracting, stimulating, and convulsing the Vessels, it cuts, attenuates and thins in the first Case; and blunts, sheaths, relaxes, and pacifies in the last: For the same Reason it is good in a Cough, caused either from the Grossness of the Humours, Sharpness of the Salts, or Thinness of the Blood, or in a Hoarseness from the Stuffing of the tracheal Vessels with a fizy Slime, or from a Dryness of the Parts; especially in that Hoarseness which attends ardent Fevers, it is good, if mixed with Syrup of Violets and Water. In a bastard Pleurisy or Consumption it is very beneficial; for in the first it attenuates, and wastes the gross and flatulent Humours by Sweat; in the last it cleanses the Ulcers, sweetens the Blood, blunts its Salts, lines the Vessels with a balsamic *Litus*, and helps to heal them. In Syncope and Fainting it revives the Spirits, takes off Swooning and low Spiritedness. The Spirit of Elder Berries (like Brandy) or Wine made of the dried Berries, strengthens a weak, and cures a flatulent Stomach, carries off the Phlegm and helps Digestion, stops the Belchings and Vomitings of a lax and cold Stomach. This Wine cures and prevents flatulent Cholicks, by helping downward pituitous, vitrious, and flatulent Humours; therefore it is also good in Worms, especially if Bitters be infused in it. In all Fluxes of the Belly, *Crollius*, *Quercetan*, and *Wolffius* pretend a great Secret of the Juice of the Berries. *e. g.* Flower made into a Paste and baked, then pounded and baked again, with fresh Juice, and so a third Time, one Dram of this with a

little Nutmeg in a soft roasted Egg, they say, cures the most obstinate Looseness, but it is so astringent that they gave two or three Purges of the Syrup of Elder Flower made with Elder Flower Water. In a great Constipation, *Hippocrates* and *Ægineta* recommend Juice of Elder Leaves, or their Water with the Syrup of the Flowers. There is also an hysterick Spirit made of Elder which cures Vapours, brings down the *Menses*, expells Birth and After-birth. *Hippocrates* cured most uterine Disorders by Things prepared out of this Shrub, as *Hydrops Uterinus*, suppressed *Lochia*, Inflammations or Ulcers of the *Uterus*, &c. Arthritick and Rheumatick Pains receive great Relief by attenuating and sweetning the Blood by gentle Purgation and Sweating; these the Elder afford. Thus I have given a short Detail of the Benefits the Elder Tree affords us, by a Wine either of the Flowers (which tho' fetid, yet its Usefulness fully compensates its disagreeable Taste) or Juice of the Berries, or of the dried Berries, or Juice or Syrup of Leaves or Flowers; I might have enumerated several others warranted and recommended by incontestable Authority should I not be too tedious; I have omitted its External Uses, which are as numerous as its Internal. The bad Effects of this Wine may be gathered from what is said in the first Paragraph.

Of R A S B E R R Y - W I N E.

OF all our made Wines those of Strawberries and Raspberries are most delicious to the Taste; they lightly and pleasantly stimulate the Nerves of the Mouth and Nose with a most agreeable Smell and Taste, which proceeds from a Mixture of their essential Salt and fine Oil, for the Principles of both those Berries are very near the same, only Raspberries contain more fine Oil, and the other more Phlegm; therefore I shall briefly consider them promiscuously.

These Wines are very proper and reviving in Syncope, Faintings, or Swoonings, because they gently and pleasantly tickle the Nerves, their mature, and attenuated Oil and essential Salt, being by Fermentation reduced to a subtile Spirit, pierce the Interstices of the Vessels, raise the Spirits, afford speedy Supply of some nervous Juice which invigorates their Springs. In scorbutic Disorders, the Use of those purify and sweeten the Blood, dilute or obtund its Salts, give the Fibres a better Tension to promote a due Mixture of the Juices. In nephritick Pains,

Pains, they sweetly stimulate the secretory Ducts of the renal Glands, lightly prick the Membranes of the small renal Basons, whereby they being excited and invigorated shake off their stagnating, attracting, and cohering Load, and free the Parts from Pain; the Phlegm of the Wine at the same Time has no small Share in diluting and attenuating the Slime or Sand in the Kidneys. In Rowness, Weakness, and Indigestion of the Stomach, the agreeable Titillation of these Wines gives its Coats a better Tension, elevates their Spring, and fortifies it. Their slight Astringency, together with their sweetly warming Spirit, make them proper in Loosenesses, and too great Discharge of the *Menses*; their Plenty of make them more cooling and moistening, than other Wines, therefore are they preferable in Thirst. As they are cordial and cooling, they and Water mixed make a good reviving Draught in ardent Fevers; as they cool and moisten, they are very proper for warm Weather, young People, bilious Constitutions, in too Sharp or Fluid a State of the Blood, or where the Animal Juices are too much agitated (I know of no bad Effects they have, except they be drank to Excess; which is rarely the Case in drinking of made Wines) but here we would be understood as speaking only of small Wines of this Sort.

N. B. To prevent Mistakes in the Prejudiced or Unwary, from what I have said on Spirits; I must add; there is a great Odds between their real and apparent Effects; for by the first they give a sudden Contraction to the Fibres and Vessels, and coagulate the Blood and their Animal Juices, in Proportion to the Quantity drunk, as I have proved from several Experiments mentioned in another Discourse, and oftner than once hinted in this *Appendix*. But from their apparent Effects, they seem (tho' falsely) to rarefy the Fluids and relax the Solids, like Opiates by their causing a stammering Speech or Dumbness, Inability to use Feet or Hands to good Purpose, Dosing, Sleepiness and Drunkenness, &c. from their producing a Distension and Dilatation of the Vessels of the Brain. Hence, 1. The constituting Membranes of those Vessels become thinner, and occasion a too large Secretion there; 2. Very probably this Distension compresses the Origins of the Nerves; Hence a regular Influx of the nervous Juices is lessened or prevented. Spirits also cause a depauperated State of the Fluids, by suddenly contracting and relaxing the Vessels till their Tones is destroyed, whereby the Ballance of Nature between Solids and Fluids is lost, and with it the due and necessary Mixture of the Blood.

A CATALOGUE of the Authors and Papers abridged in this Work.

Doctors.

- | | |
|---|---|
| <p>John Jones on Buxton, Page 37.
 <i>Martin Lyfter on Buxton</i>, 47.
 <i>Leigh on Buxton</i>, 48.
 <i>Allen on Buxton</i>, 59.
 <i>Martin on Buxton</i>, 59.
 <i>Witty on Scarborough</i>, 114.
 <i>Simpson's Hydrologia Chymica</i>, 121.
 <i>Wittie's Pyrologia Mimica</i>, 127.
 <i>Simpson's Hydrological Essays</i>, 132.
 <i>Tonstal's Scarborough Spaw</i> spagirically ana-
 tomized, 139.
 <i>Wittie's Scarborough Spaw Anatomiser</i> dif-
 fected, 143.
 <i>Tonstal's New Years Gift for Dr. Witty</i>,
 148.</p> | <p><i>Lister on Scarborough</i>, 152.
 <i>Foot's Letter to Dr. Wittie</i>, 152.
 <i>Highmore's Letter to Dr. Wittie</i>, <i>ibid.</i>
 <i>Wittie's Answer to both</i>, 155.
 <i>Simpson's Answer to Dr. Foot</i>, 158.
 <i>Simpson's Answer to Tonstal</i>, 159.
 <i>Allen on Scarborough</i>, <i>ibid.</i>
 <i>Simpson on Malton</i>, 197.
 <i>Dean's Spadacrene Anglica</i>, 236.
 <i>Stanhope's Summons to the Northern</i>
 <i>Spaw</i>, 242.
 <i>Frenche's Yorkshire Spaw</i>, 246.
 <i>Simpson's Knaresburgh Spaw</i>, 259.
 <i>Neal on Harrigate Spaws</i>, 286.</p> |
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A TABLE of the Waters examined.

Note, y. stands for *Yorkshire*, d. for *Derbyshire*, l. for *Lincolnshire*, n. for *Noting-
hamshire*.

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| <p>Albledee Spaw, y. 280.
 <i>Acworth Spaw</i>, y. <i>ibid.</i>
 <i>Aswarby Spaw</i>, l. 215.
 <i>Askeron Spaw</i>, y. 303.
 <i>Ansby</i>, l. 223.
 <i>Ashover</i>, d. 275.
 <i>Beverley</i>, y. 280.
 <i>Beighton</i>, d. 275.
 <i>Beauchief</i>, d. 277.
 <i>Bilton</i>, y. 296.
 <i>Buxton</i>, d. 23.
 <i>Blackpark</i>, y. 280.
 <i>Buxton-Chalybeate</i>, d. 229.
 <i>Burlington</i>, y. 230.
 <i>Broomless-Moor</i>, y. 272.
 <i>Burleigh-Moor</i>, y. 275.
 <i>Bandwell</i>, l. 107.</p> | <p><i>Bullhouse</i>, y. 281.
 <i>Bithams</i>, y. 276.
 <i>Burgh</i>, d. 277.
 <i>Burleigh, Exeter</i>, 277.
 <i>Braughton</i>, y. 300.
 <i>Catcliff</i>, y. 304.
 <i>Cawley</i>, d. 305.
 <i>Cawthorp</i>, l. 224.
 <i>Crawshaw Spaw</i>, y. 275.
 <i>Castleton</i>, d. 277.
 <i>Chesterfield</i>, d. <i>ibid.</i>
 <i>Cricklee</i>, y. 300.
 <i>Croft Spaw</i>, y. 299.
 <i>Cropton (high)</i>, y. 280.
 <i>Darnal</i>, y. 275.
 <i>Darfield</i>, y. 276.
 <i>Dofield</i>, 4 Spaws, d. 275.</p> |
|---|--|

Didderfley

A TABLE of the Waters examined.

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Knareburgh Chalyb, 136.
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Middleton (Stoney) Chal. d. 280.
Middleton, y. 280.
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Normanby (Upper) y. 299.
Normanby (Nether) y. *ibid.*
Newtondale, y. 297.
Oldfield Spaw, y. 297.
Orston, n. 220.
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Rawmarsh, y. 276.

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Retford (East) n. 228.
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Number of Spaws examined in this Work
 one hundred and thirty one.

ERRATA

ERRATA.

N. B. *p.* stands for Page, *l.* for Line, *n.* for Notes, *c.* 1 or 2 for Column first or second.

Preface Page v. Line 27. for *Stones* read *Pores*. p. vi. l. 9. for *wanted* r. *reckon'd*. p. xi. l. 34. for *or Copper* r. *of Copper*. p. xii. l. 3. for *owning* r. *allowing*. p. xvi. l. 24. r. *was any Stone which*. p. xix. l. 12. for *croft* r. *Croft*. p. xx. l. 11. for *had before given* r. *did afterwards find it necessary to give*.

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Lately published.

A DISSERTATION upon TEA, explaining its Nature and Properties by many new Experiments; and demonstrating from philosophical Principles, the various Effects it has on different Constitutions. To which is added the natural History of Tea; and a Detection of the several Frauds used in preparing it. Also a Discourse on the Virtues of Sage and Water, and an Enquiry into the Reasons *Why the same Food is not equally agreeable to all Constitutions*; in a Letter to the Right Honourable MARY Lady MALTON. By THOMAS SHORT, M. D. Sold by Fletcher Gyles against Gray's-Inn in Holborn.

Fig. 1
Crystals of Marine
Salt alone.

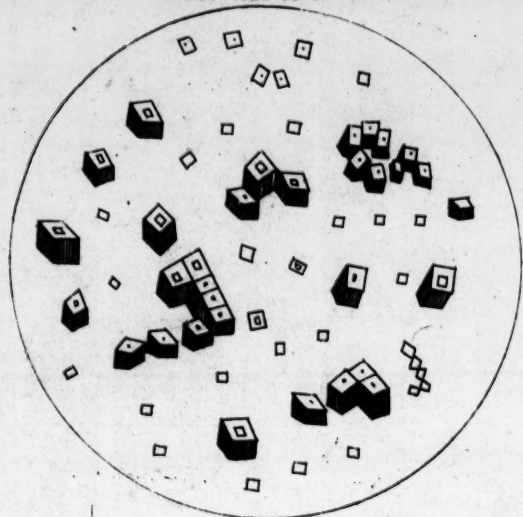


Fig. 2
Crystals of Nitriol extracted from the Alum
well (so called) above Buxton

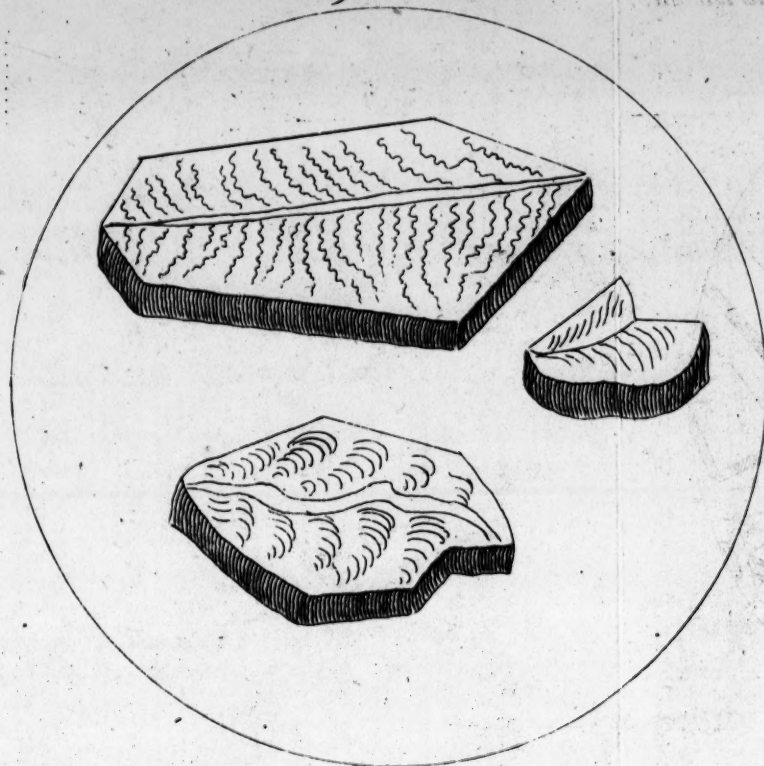


Fig. 3
Crystals of Alum from the
Salt of the Stone

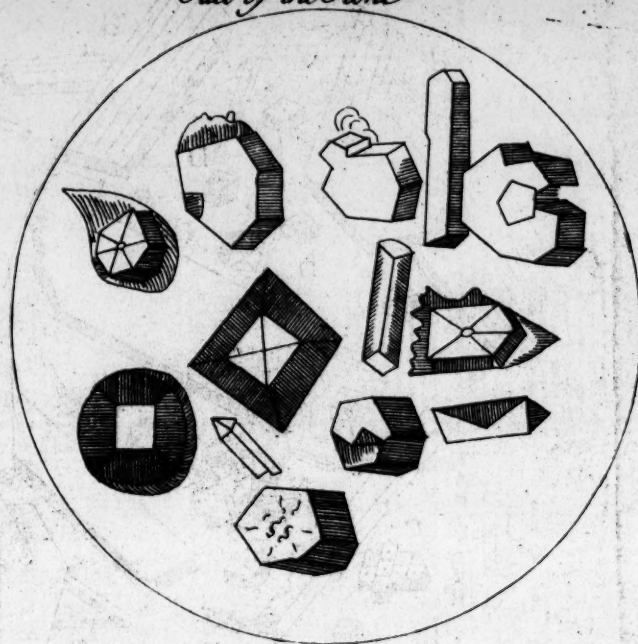


Fig. 4
Buxton Bath Salt wherein a a a &c represents y^e Crystals of
Nitre b b b & Marine Salt c c c Clusters of Crystals of Marine Salt.

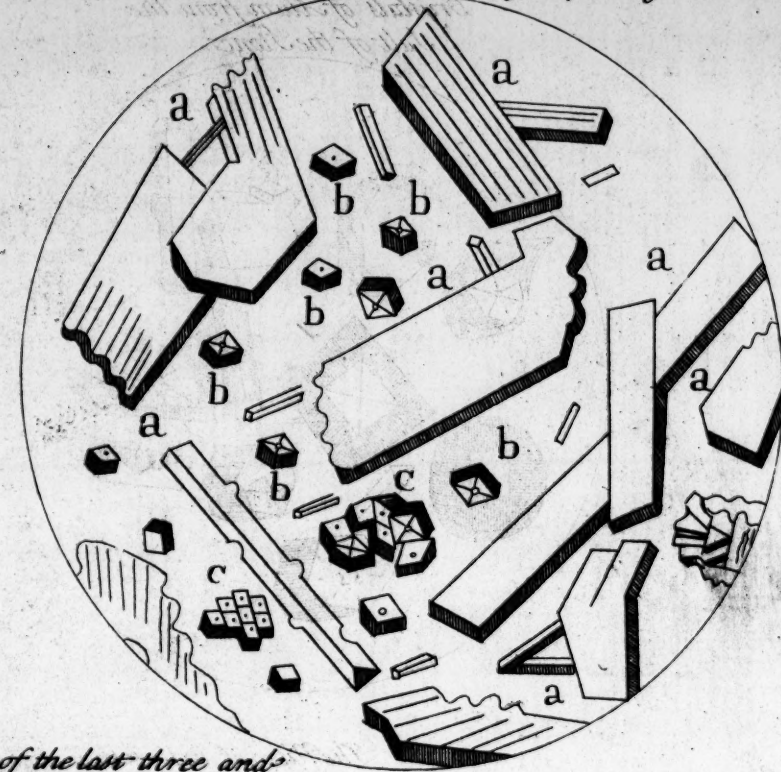


Fig. 5
The Crystals of Salt from S^t. Annas Well a a a Nitre
b b b Marine Salt c c c Clusters of the Salt.

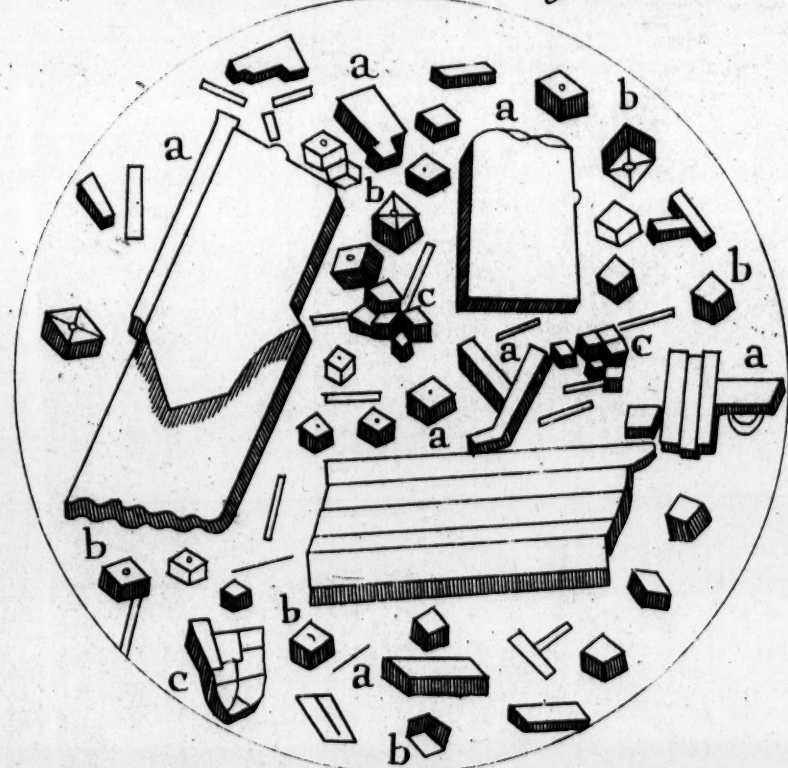


Fig. 6
M^r. Leighs or Bingham Well a Nitre
b Marine Salt.

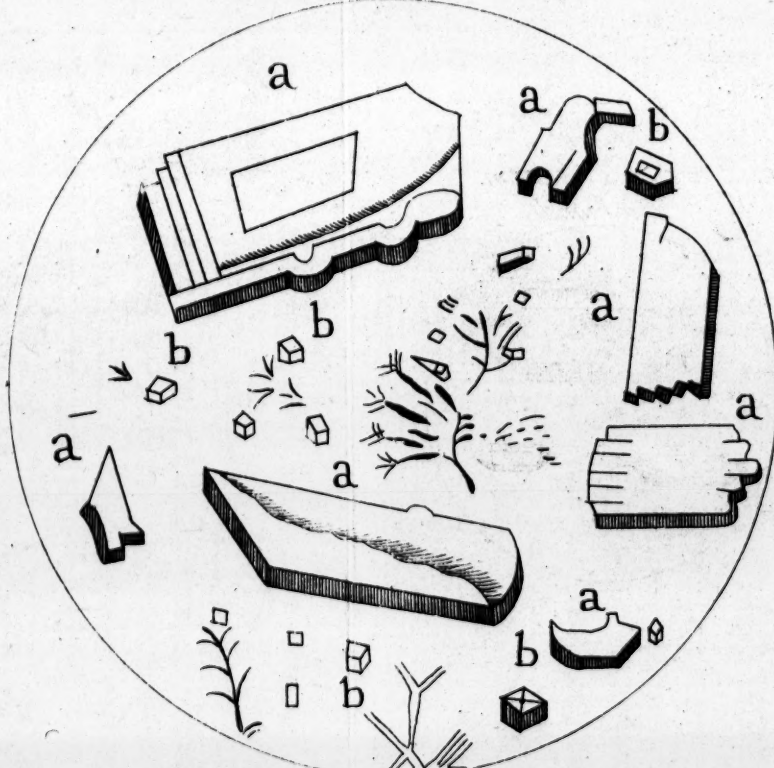


Fig. 7
The Nitre of the last three, taken out of the last three and
laid on a Tancer by its self a a a Nitre b one of the
Crystals broke transverse c c c represent y^e ends of those Crystals
x a Crystals of Nitre with several Crystals of Marine Salt
within it

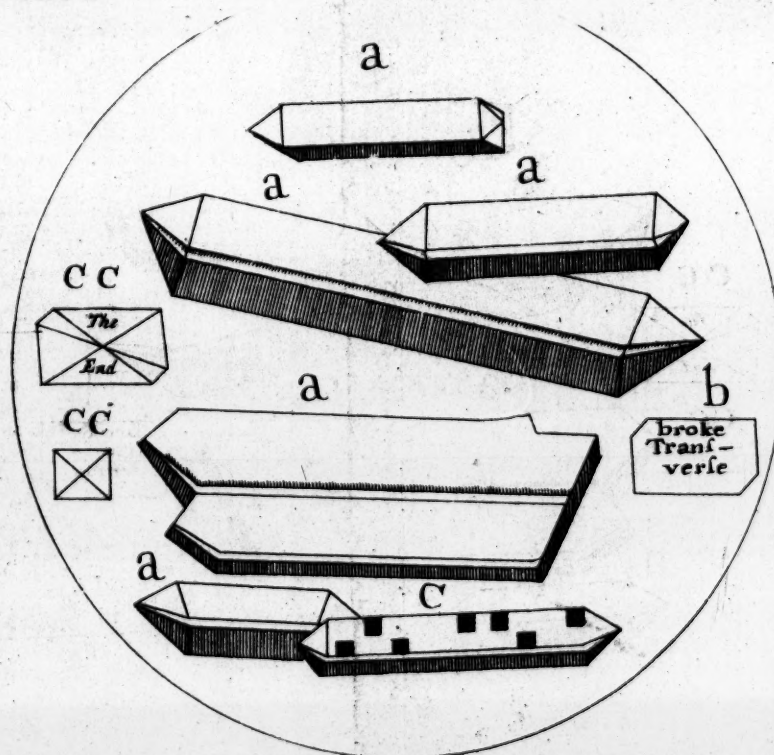
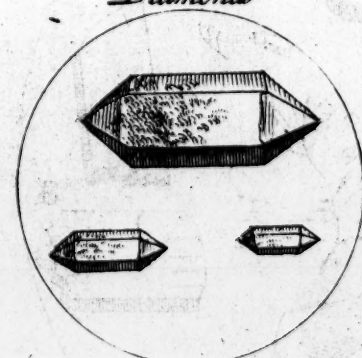


Fig. 8
Represents Buxton
Diamonds



To the most Noble and Illustrious Prince, William Duke of Devonshire
this Plate with the Discourse on Buxton Waters is most humbly Dedicated by his Graces,
most humble Servant
Tho: Short.

Fig. 9.
Crystals of Salt of Harrigate Knarsburgh, Reddism, Oldfield, Skipton,
Bilston Park, Shuttle Wood, Orpington & Normandy, Sulphur waters all Marine
Salt.

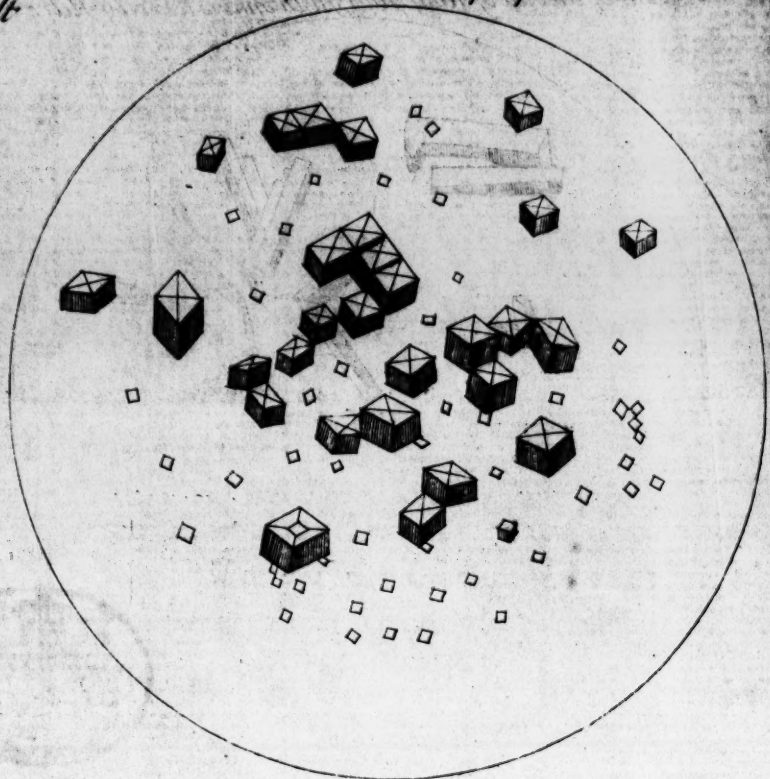


Fig. 10.
Crystals of the Salt of Knarsburgh, Drapping & Sandy Nitre

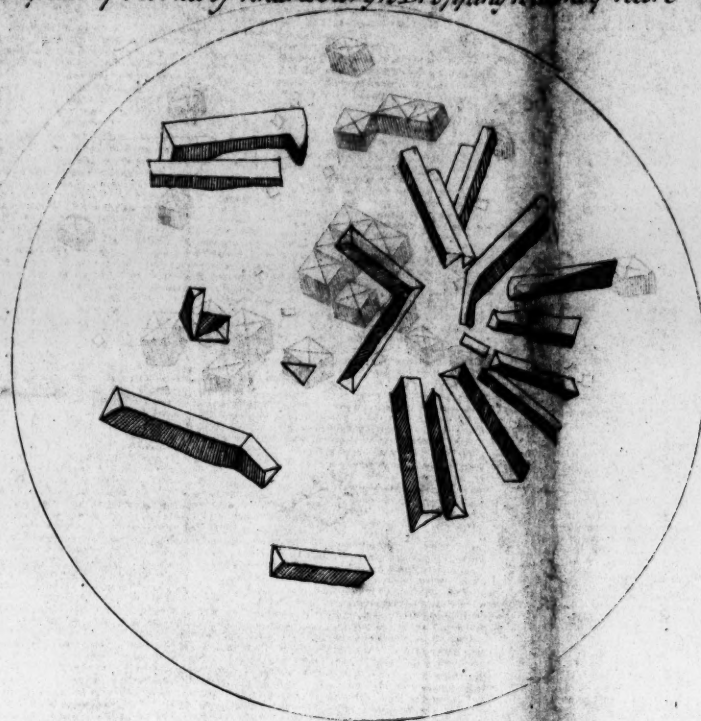


Fig. 11.
Crystals of the Salt of Stanfield Band or Binding well Nitre
a a a Nitre Marine Salt b b b b.

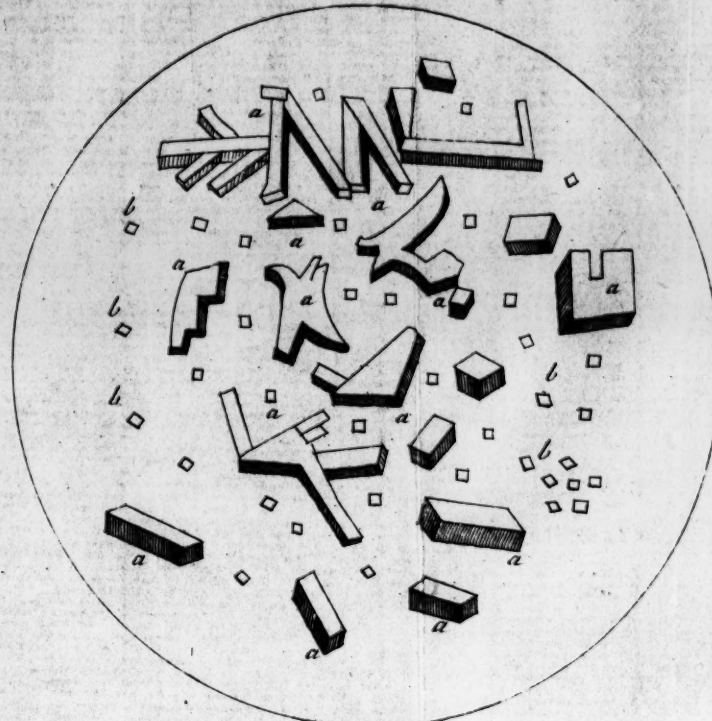


Fig. 12.
Crystals of the Salt of Wigglesworth Span.

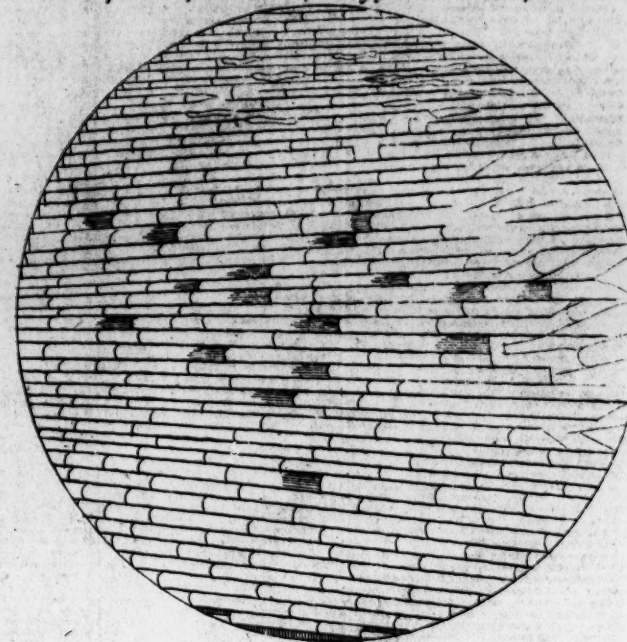


Fig. 17.
Crystals of the Salt of Stoney Middleton Drinking Span
a a a Marine Salt b b b Nitre.

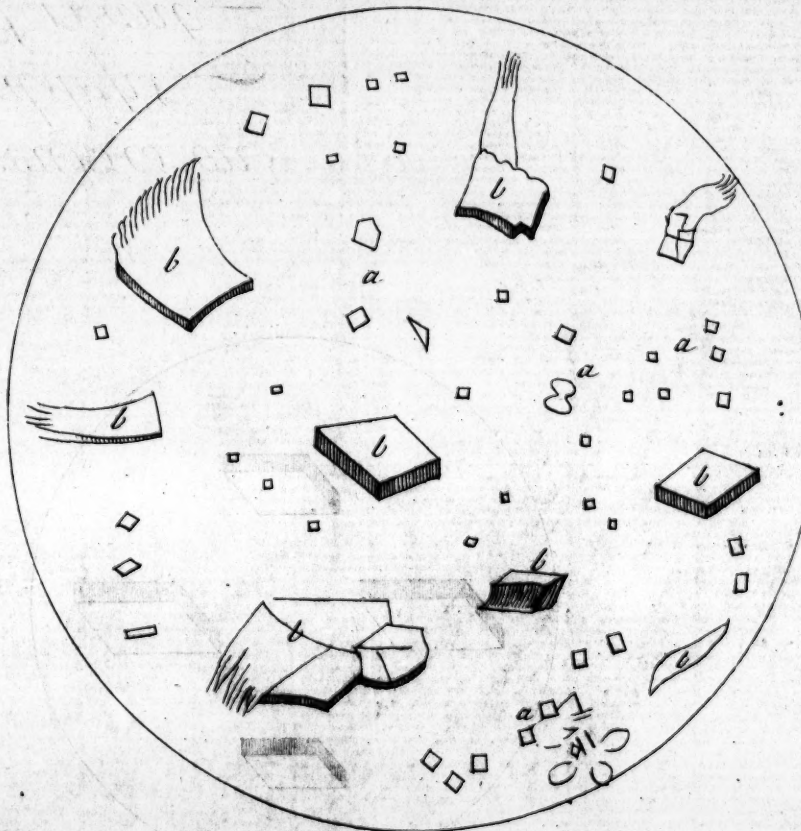


Fig. 13.
Crystals of the Salt of Braughton Span a a a Nitre.
the small black spots are Marine Salt.

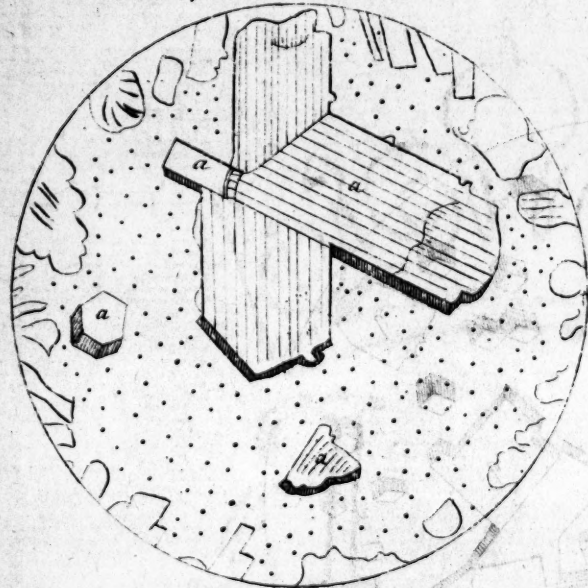


Fig. 14.
Crystals of the Salts of Gricklegrounds Span a a a
Nitre b b b rest are Marine Salt.

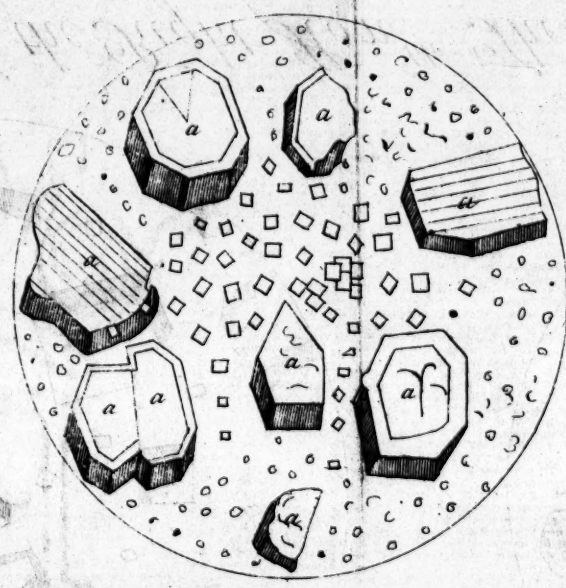


Fig. 15.
Crystals of the Salt of Giggleswick Span all Nitre.

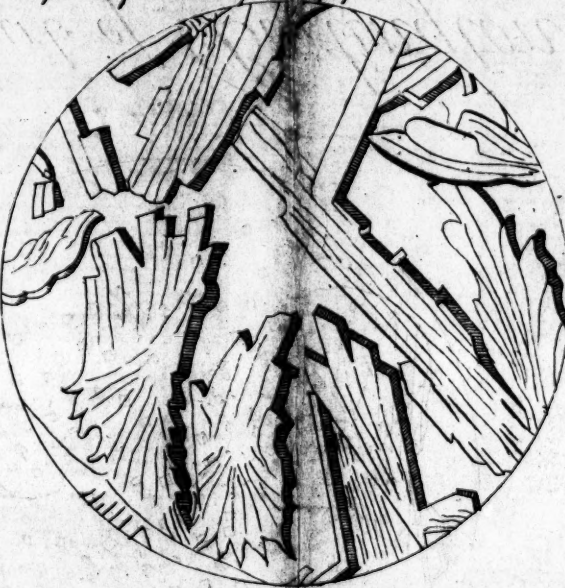


Fig. 16.
Crystals of the Salt of Middleton Bath Warm
Water, a a a Marine Salt b b b Nitre.

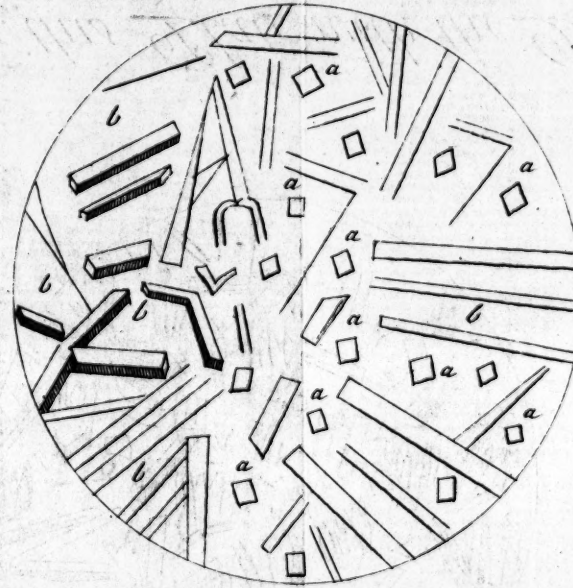


Fig. 18.
Crystals of the Salt of Stoney Middleton
warm Bath a a a Marine Salt b b b Nitre.

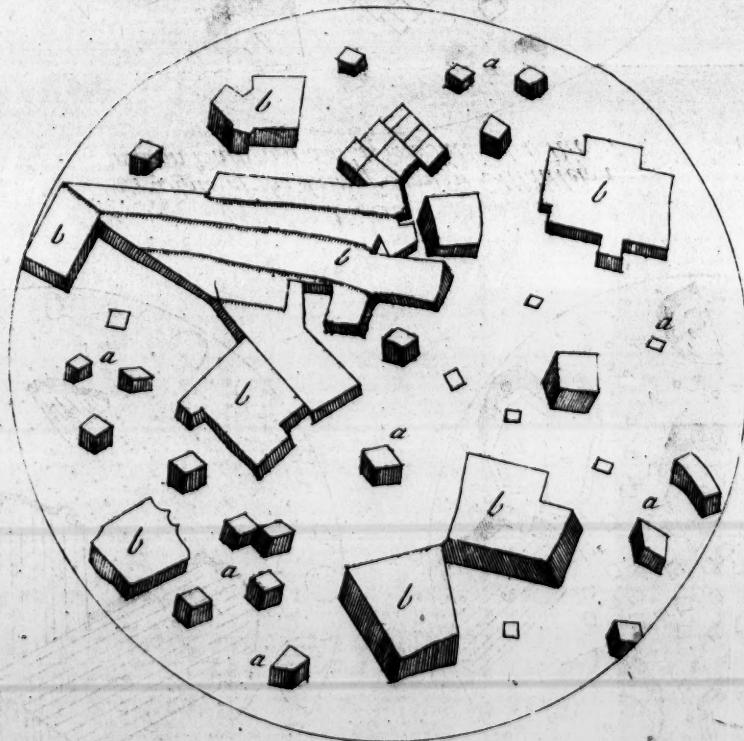


Fig. 19.
Crystals of the Salt of Kidderwell,
a a a Marine Salt b b b Nitre.

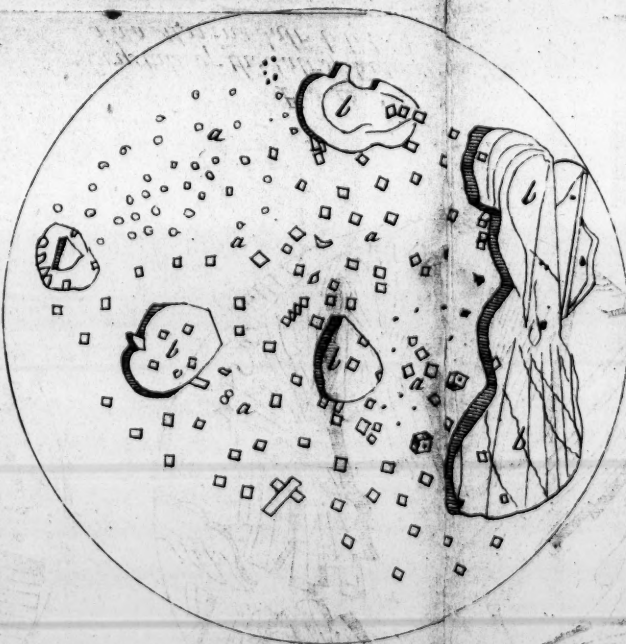


Fig. 20.
Crystals of the Salt of Giggleswick Span
a a a Marine Salt b b b Nitre.

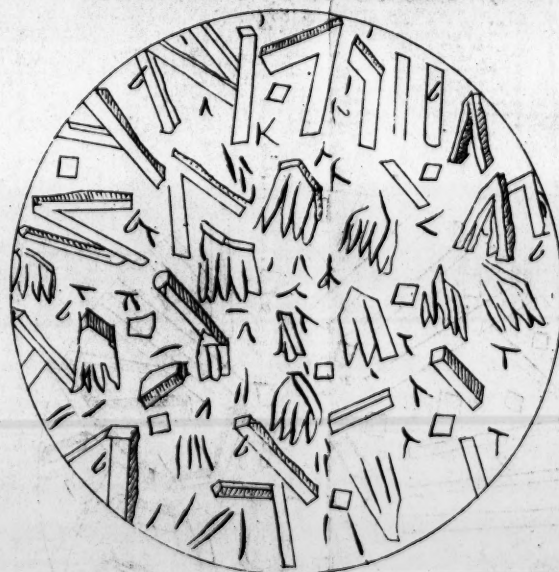
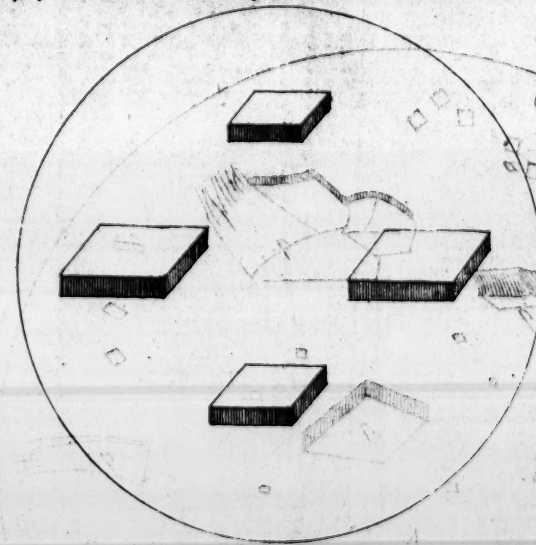


Fig. 21.
Crystals of immature Nitre from the
pyrites under Harrigate Alum well.



To the Right Hon^{ble} The Earl of Burlington &c. this Plate with the Discourses on,
Knarsburgh, Harrigate & Stoney Middleton is humbly Dedicated by his Lordships
most humble Servant
Tho. Short.

Fig. 22.
Crystals of the Salt of Malton Span b b b b b
Nitre a a a a First View.



Fig. 23
Crystals of the Salt of Malton Span Discolored
and Filtered several times & are chiefly Nitre.

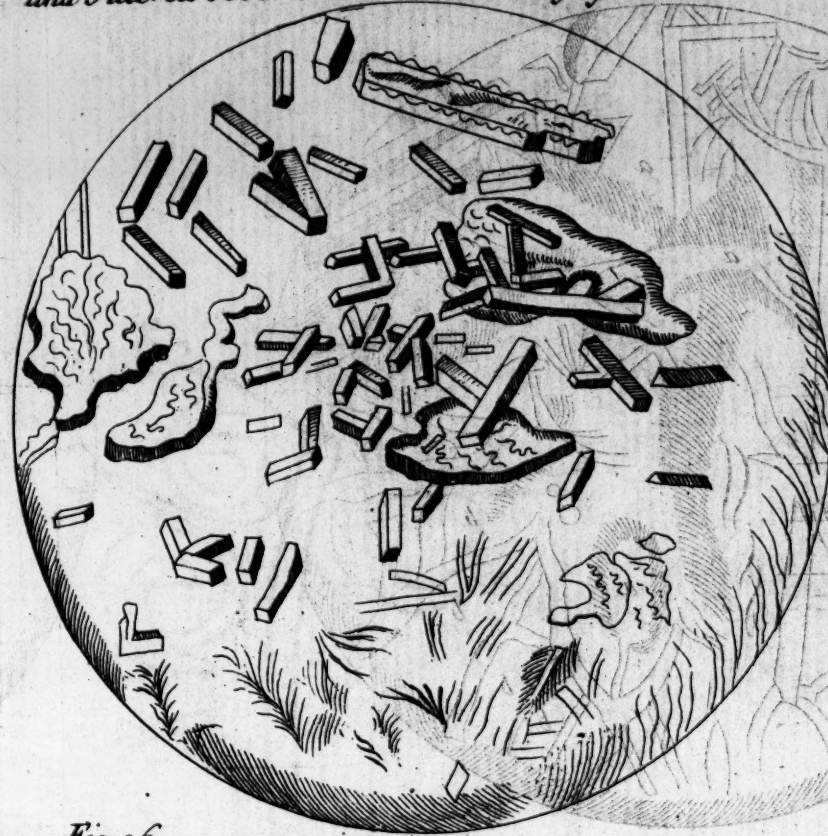


Fig. 24
Crystals of the Salt of Thurst Span b b b Nitre
a a a Marine Salt.

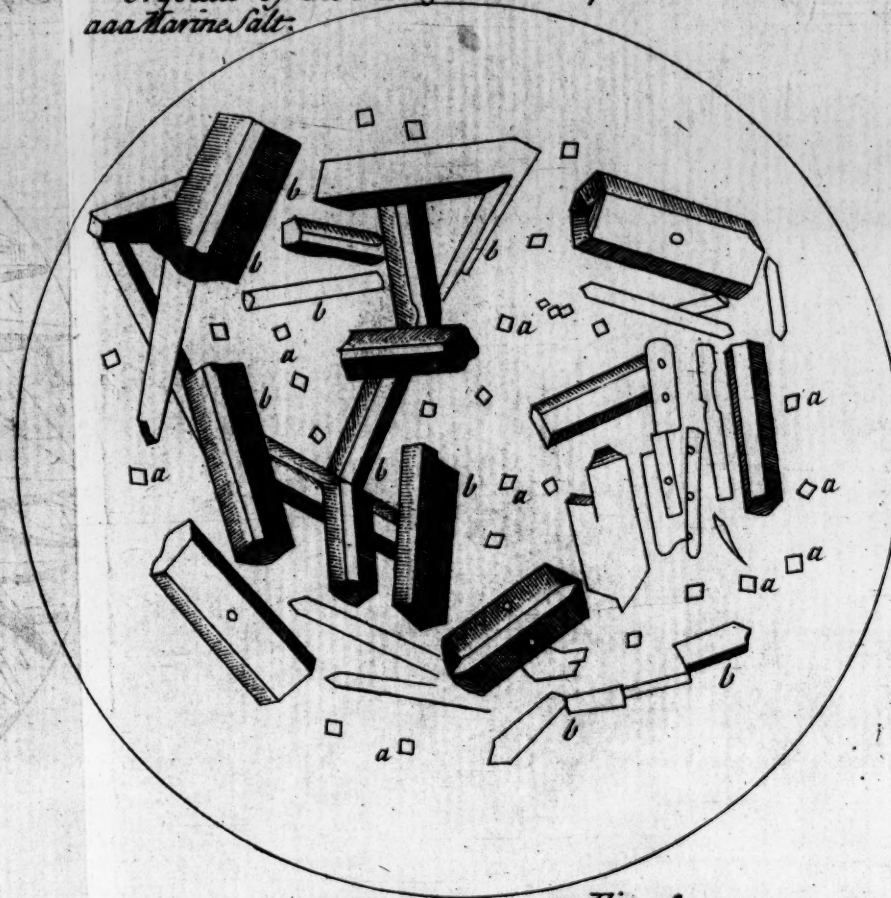


Fig. 25
The Salts of Pyrmont and
German Span Waters.

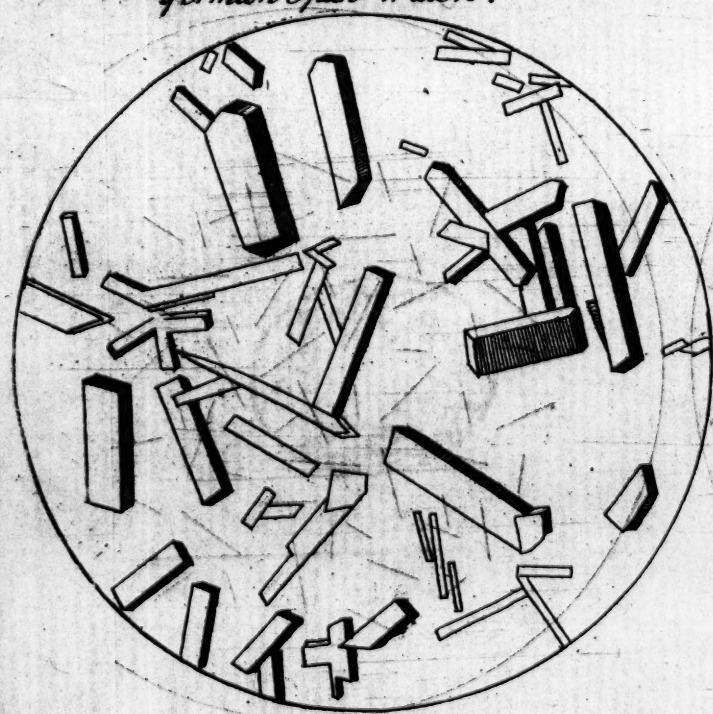


Fig. 26
The Salts of Tibshelf Water, the Black
Spots are Marine Salt b b b Nitre.

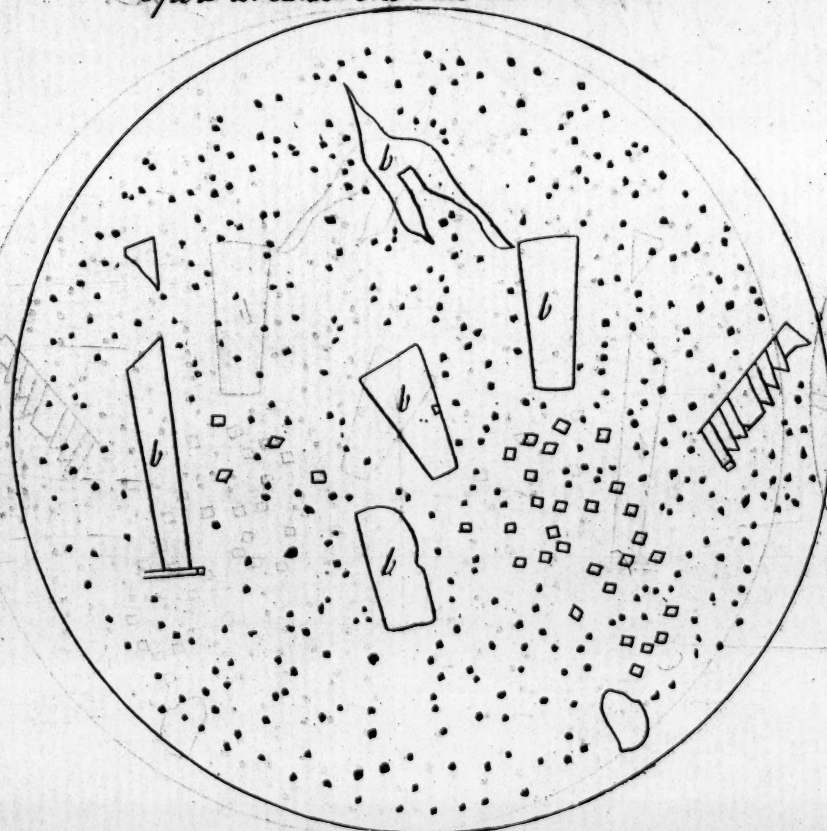


Fig. 27
The Salt of Bromley Moor Span.

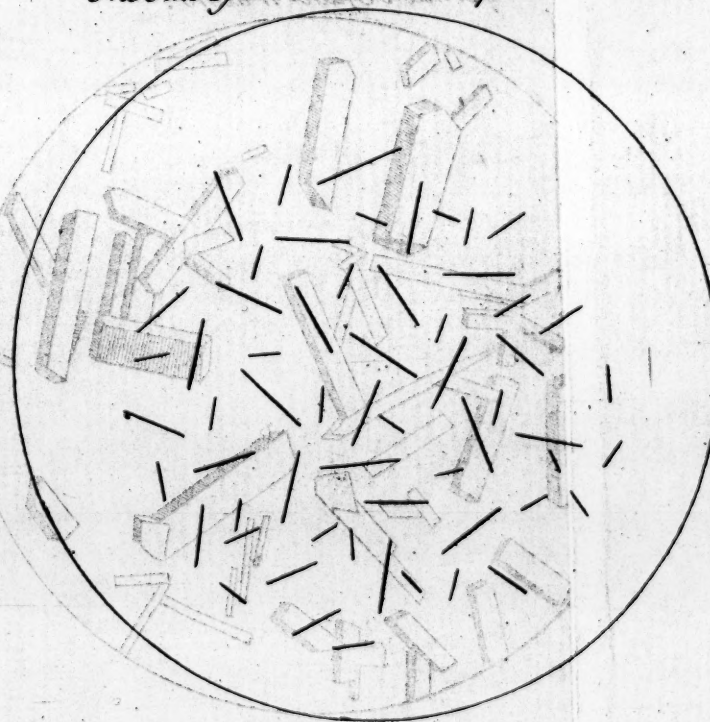
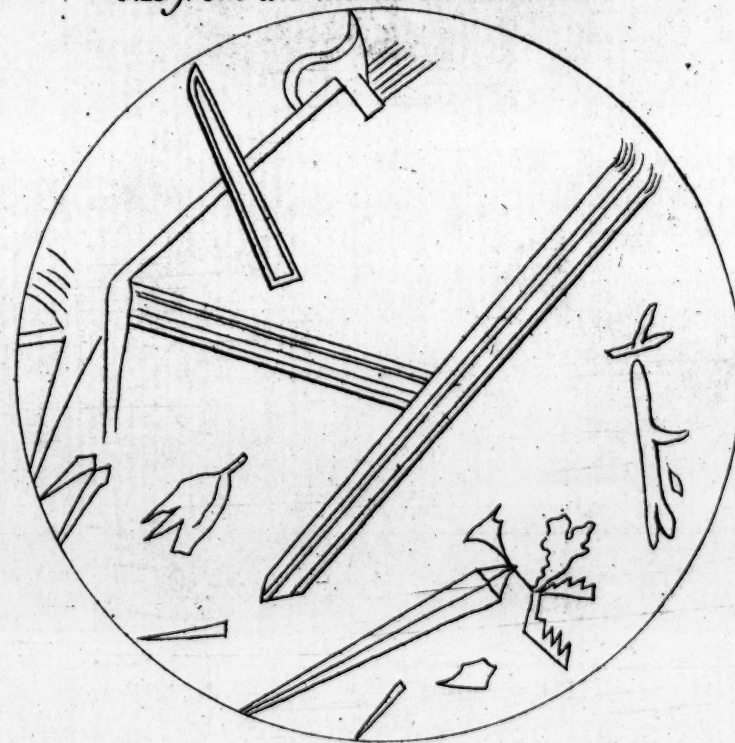


Fig. 28
Crystals of the Salt of a Water sent
Me from an unknown hand.



To the Right Honourable Tho: Lord. Malton, &c. &c.

This Plate with the History of Malton Span, &c. is dedicated by his Lordships,

most Obliged & Obedient humble Serv^t Tho: Short.

Fig. 29.
Crystals of Scarborough Purging Water Salts
b b b Nitre a a a Marine Salt

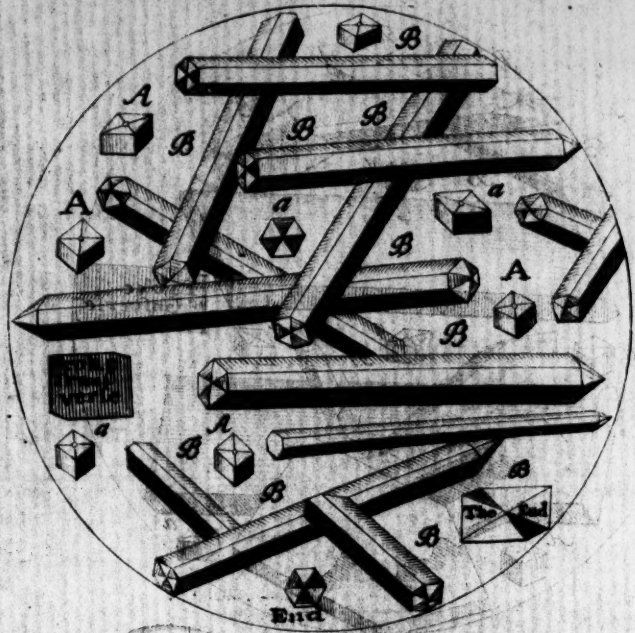


Fig. 30.
Crystals of the Salt of Scarborough Chalybeate
Water a a a Marine Salt b b b Nitre

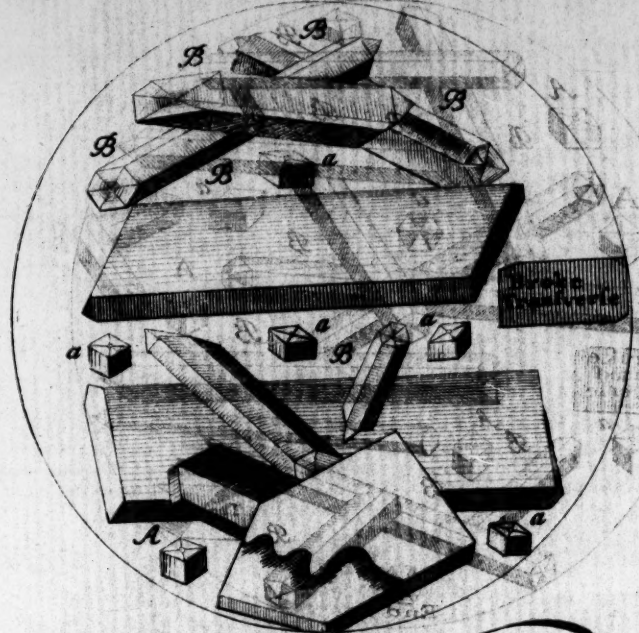
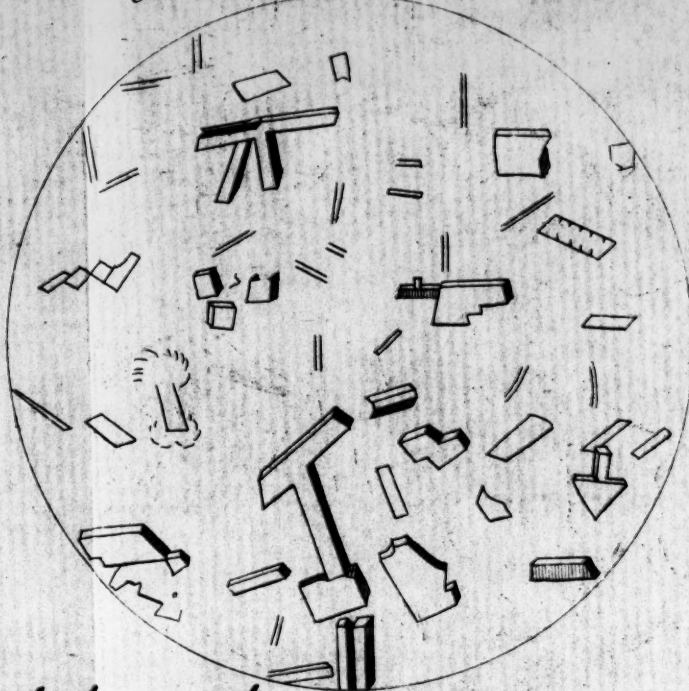


Fig. 31
Crystals of the Salt of Orston Span Water.



To the Right Honourable S^r Will^m Strickland His MAJESTIES
Secretary at War This Plate n^o. y^e Examination & Discourse on Scarborough Waters. is dedicated by his
very humble Serv^t Tho. Short.

Fig. 32.
Crystals of the Salt of Aswarby Span,
which are only Nitre.

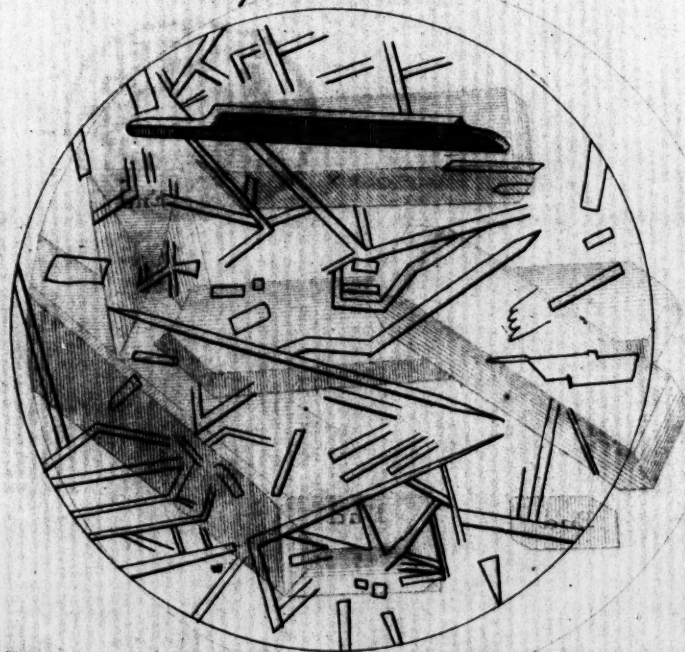


Fig. 33.
Crystals of Aswarby Salt perfectly formed

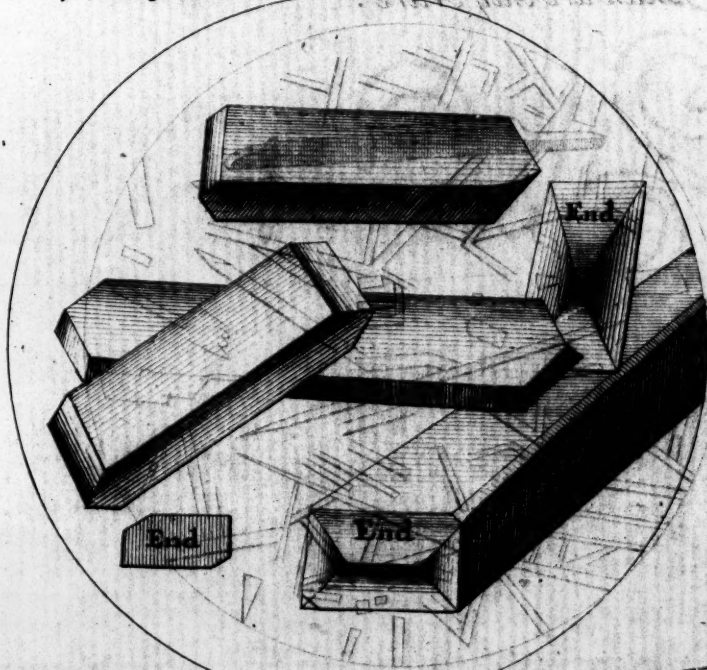
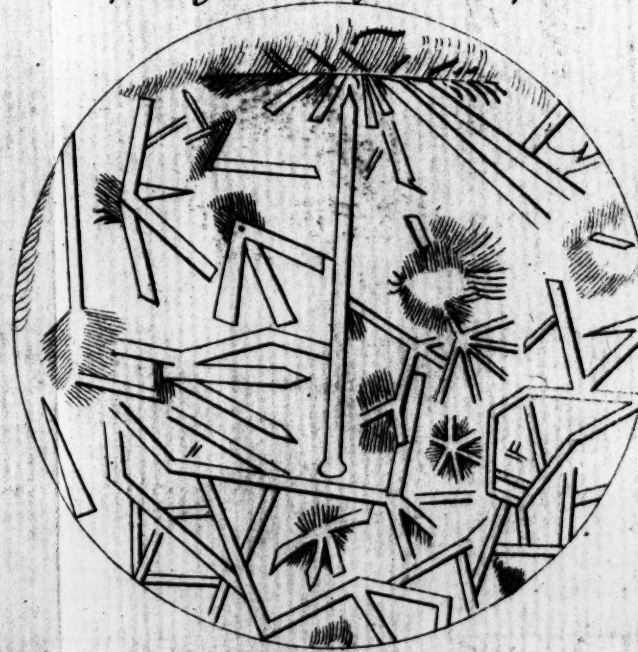


Fig. 34
Crystals of the Salt of Walcote Span.



To the Honourable S^r Fran^{cois} Whichcote Bar. This Plate
with the Examination & Discourse on Aswarby Span is dedicated by his
very humble & oblig'd Serv^t Tho. Short.